

INDEPENDENT ORBITER ASSESSMENT

ANALYSIS OF THE MAIN PROPULSION SYSTEM

16 JANUARY 1987

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

WORKING PAPER NO. 1.0-WP-VA86001-22

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16 January 1987

This Working Paper is Submitted to NASA under
Task Order No. VA86001, Contract NAS 9-17650

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Independent Orbiter Assessment
Analysis of the Main Propulsion System

1.0 EXECUTIVE SUMMARY

The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. The IOA approach features a top-down analysis of the hardware to determine failure modes, criticality, and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. This report documents (Appendix C) the independent analysis results for the Orbiter Main Propulsion System (MPS) hardware.

The Orbiter MPS consists of two subsystems; the Propellant Management Subsystem (PMS) and the Helium Subsystem. The PMS is a system of manifolds, distribution lines and valves by which the liquid propellants pass from the External Tank (ET) to the Space Shuttle Main Engines (SSMEs) and gaseous propellants pass from the SSMEs to the ET. The Helium Subsystem consists of a series of helium supply tanks and their associated regulators, check valves, distribution lines, and control valves. The Helium Subsystem supplies helium that is used within the SSMEs for in-flight purges and provides pressure for actuation of SSME valves during emergency pneumatic shutdowns. The balance of the helium is used to provide pressure to operate the pneumatically actuated valves within the PMS.

The IOA analysis made use of available Orbiter MPS schematics and hardware assembly and component drawings. Each component was evaluated and analyzed for possible failure modes and effects. Criticalities were assigned based on the worst possible effect of each failure mode.

A summary of the number of possible failure modes and corresponding criticalities is given below. The presentation format is Hardware (HW) criticality first and Functional (F) criticality second.

Summary of IOA Failure Modes By Criticality (HW/F)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number :	129	142	30	94	70	225	690

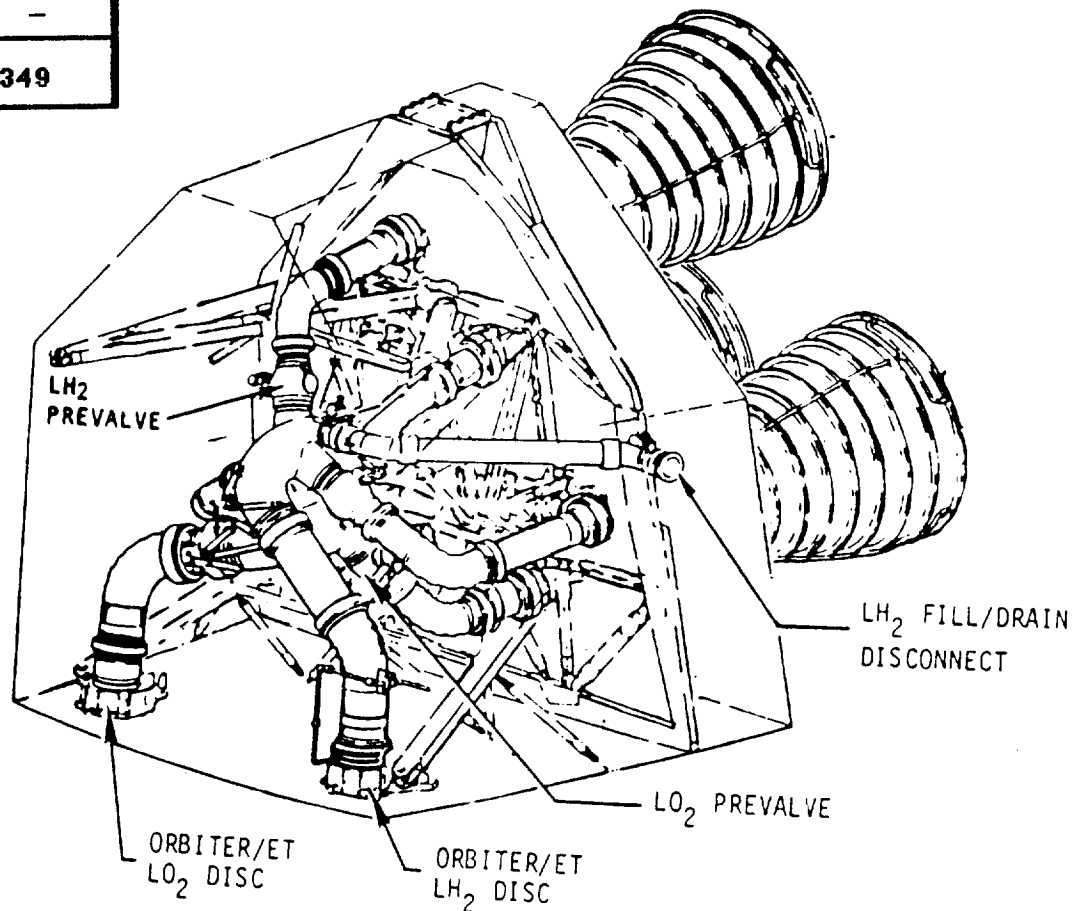
Figure 1 presents a summary of the failure criticalities for each of the MPS subsystems.

For each failure mode identified, the criticality and redundancy screens were examined to identify critical items. A summary of Potential Critical Items (PCIs) is presented as follows:

Summary of IOA Potential Critical Items (HW/F)						
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
Number :	129	142	30	25	23	349

Of the 690 failure modes analyzed, 349 were determined to be PCIs.

ORBITER MPS SUMMARY		
CRIT	#FM	#PCI
1/1	129	129
2/1R	142	142
2/2	30	30
3/1R	94	25
3/2R	70	23
3/ 3	225	—
TOTAL	690	349



LO2 SYSTEM		
CRIT	#FM	#PCI
1/1	53	53
2/1R	61	61
2/2	11	11
3/1R	56	14
3/2R	43	7
3/3	39	—

LH2 SYSTEM		
CRIT	#FM	#PCI
1/1	64	64
2/1R	30	30
2/2	—	—
3/1R	25	11
3/2R	—	—
3/3	64	—

HELIUM SYSTEM		
CRIT	#FM	#PCI
1/1	12	12
2/1R	51	51
2/2	19	19
3/1R	13	—
3/2R	27	16
3/3	122	—

Figure 1 - ORBITER MPS OVERVIEW ANALYSIS SUMMARY

2.0 INTRODUCTION

2.1 Purpose

The 51-L Challenger accident prompted the NASA to readdress safety policies, concepts, and rationale being used in the National Space Transportation System (NSTS). The NSTS Office has undertaken the task of reevaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assessment of the Orbiter FMEA/CIL for completeness and technical accuracy.

2.2 Scope

The scope of the independent FMEA/CIL assessment activity encompasses those Shuttle Orbiter subsystems and GFE hardware identified in the Space Shuttle Independent FMEA/CIL Assessment Contractor Statement of Work. Each subsystem analysis addresses hardware, functions, internal and external interfaces, and operational requirements for all mission phases.

2.3 Analysis Approach

The independent analysis approach is a top-down analysis utilizing as-available drawings to break down the respective subsystem into components and low-level hardware items. Each hardware item is evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the NASA and Prime Contractor FMEA/CIL reevaluation results. The IOA analysis approach is summarized in the following Steps 1.0 through 3.0. Step 4.0 summarizes the assessment of the NASA and Prime Contractor FMEAs/CILs that is performed and documented at a later date.

Step 1.0 Subsystem familiarization

- 1.1 Define subsystem functions
- 1.2 Define subsystem components
- 1.3 Define subsystem specific ground rules and assumptions

Step 2.0 Define subsystem analysis diagram

- 2.1 Define subsystem
- 2.2 Define major assemblies
- 2.3 Develop detailed subsystem representations

Step 3.0 Failure events definition

- 3.1 Construct matrix of failure modes
- 3.2 Document IOA analysis results

Step 4.0 Compare IOA analysis data to NASA FMEA/CIL

4.1 Resolve differences

4.2 Review in-house

4.3 Document assessment issues

4.4 Forward findings to Project Manager

2.4 Orbiter MPS Ground Rules and Assumptions

The Orbiter MPS ground rules and assumptions used in the IOA are defined in Appendix B.

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The Orbiter Main Propulsion System is composed of the Propellant Management Subsystem (PMS) consisting of the LO2 and LH2 subsystems and the Helium Subsystem (Figures 2A thru 2D). The PMS is a system of manifolds, distribution lines, and valves by which the liquid propellants pass from the ET to the SSMEs. Some of the propellants are vaporized in the engine and returned to the ET to maintain ullage pressure. The Helium Subsystem consists of a series of helium supply tanks and their associated regulators, check valves, distribution lines, and control valves. The Helium Subsystem supplies helium that is used within the SSMEs for in-flight purges and provides pressure for actuating SSME valves during emergency pneumatic shutdowns. The balance of the helium is used to provide pressure to actuate all the pneumatically operated valves within the PMS.

3.1.1 Propellant Management Subsystem Function

During engine burn, propellants under tank pressure flow from the ET to the Orbiter through two umbilicals; one for LO2 and the other for LH2 (Figures 3 and 4, respectively).

The PMS also provides a path which allows gases tapped from the three engines to flow back to the ET, through two gas umbilicals, to maintain pressures in the fuel and oxidizer tanks.

The PMS also functions during phases other than engine burn. During prelaunch, the PMS is used to control the loading of propellants in the ET. During orbit, PMS controls propellant dump, vacuum inerting, and system repressurization (for entry).

3.1.2 The PMS Components

The PMS contains the following major components (Figures 3 and 4).

- A. Liquid Propellant Supply and Distribution Network. The network is composed of all the liquid propellant lines used to load propellants during prelaunch, feed propellants to the SSMEs during engine burn, and dump residual propellants after ET separation. Specifically, the network consists of:

- 1. Propellant Feedline Manifolds - There are two 17-inch diameter manifolds in the Orbiter, one for LO2 and one for LH2. Both of the manifolds have a feedline disconnect valve at one end and two fill and drain valves (one inboard, one outboard) connected in series at the other end. The feedline manifolds connect to the ET liquid propellant

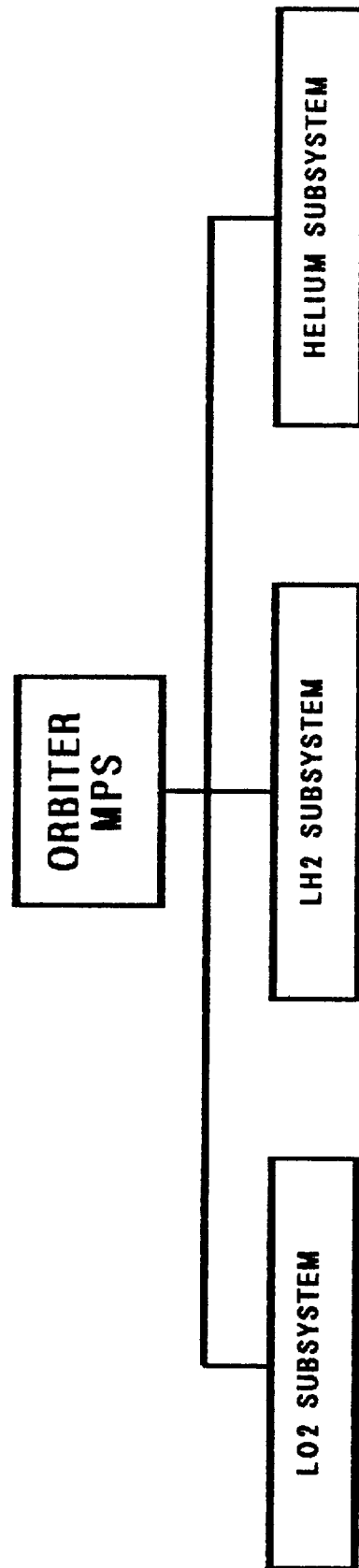


Figure 2A - ORBITER MPS SUBSYSTEMS

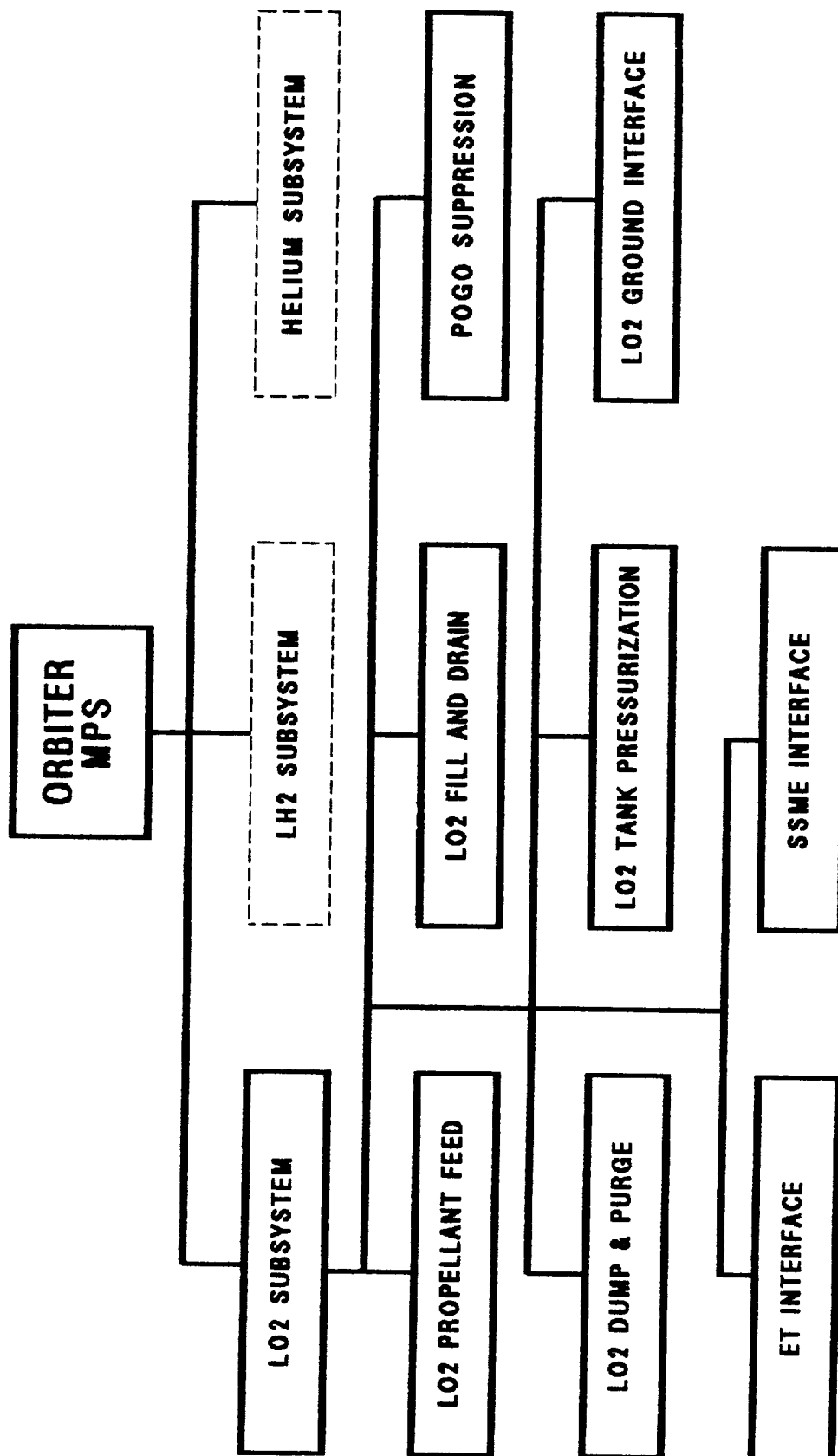


Figure 2B - ORBITER MPS L02 SUBSYSTEM OVERVIEW

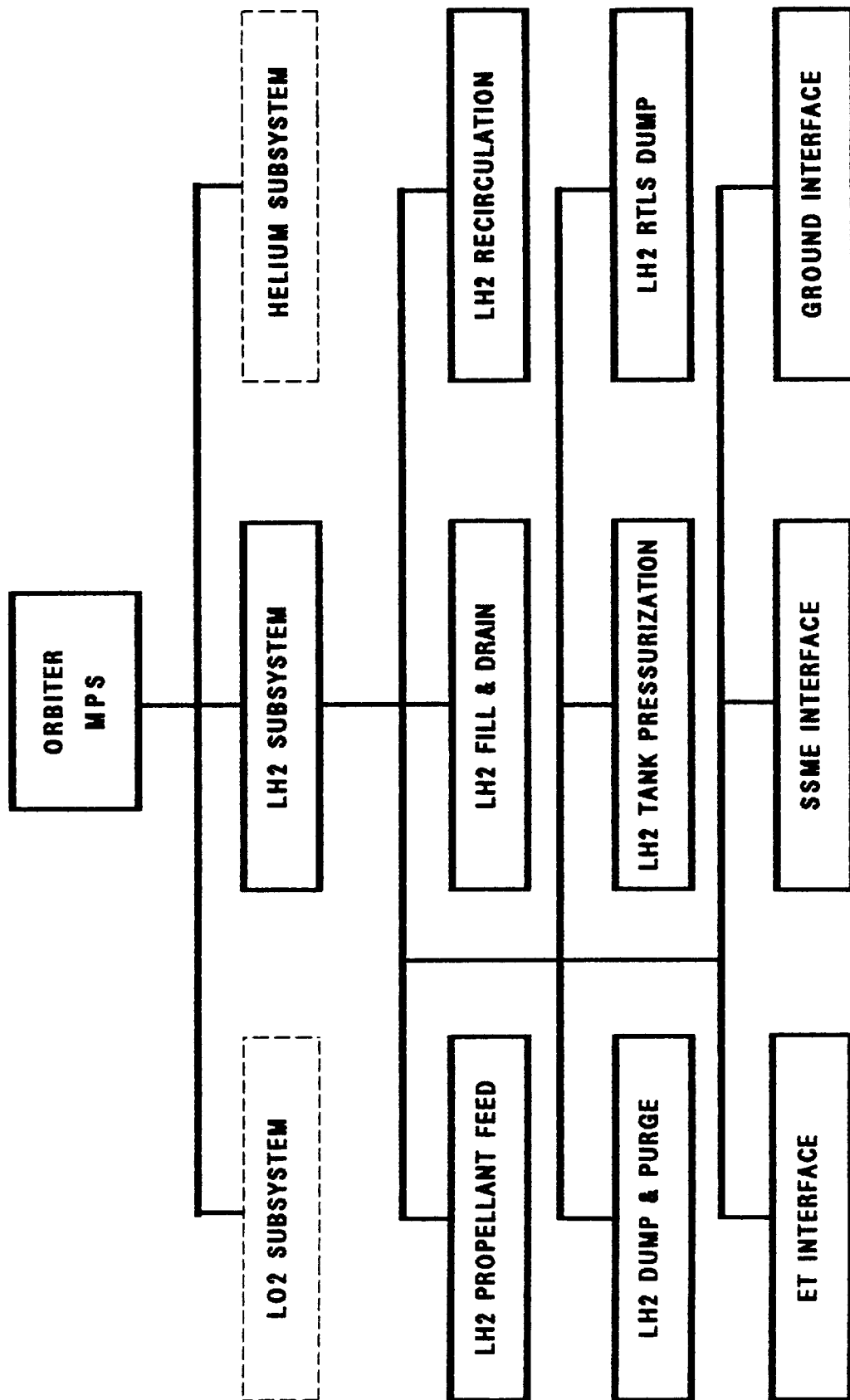


Figure 2C - ORBITER MPS LH2 SUBSYSTEM OVERVIEW

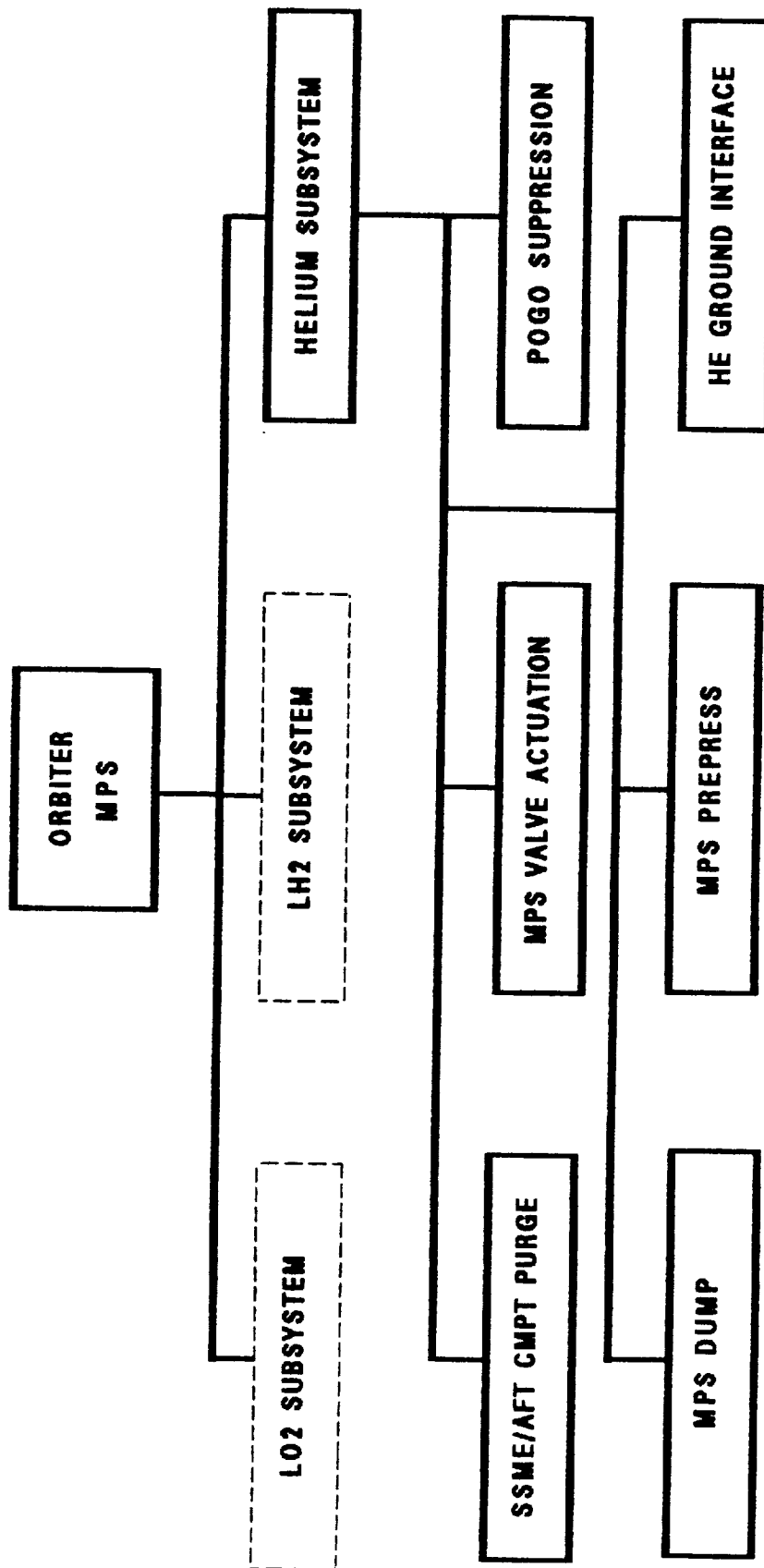


Figure 2D - ORBITER MPS HELIUM SUBSYSTEM OVERVIEW

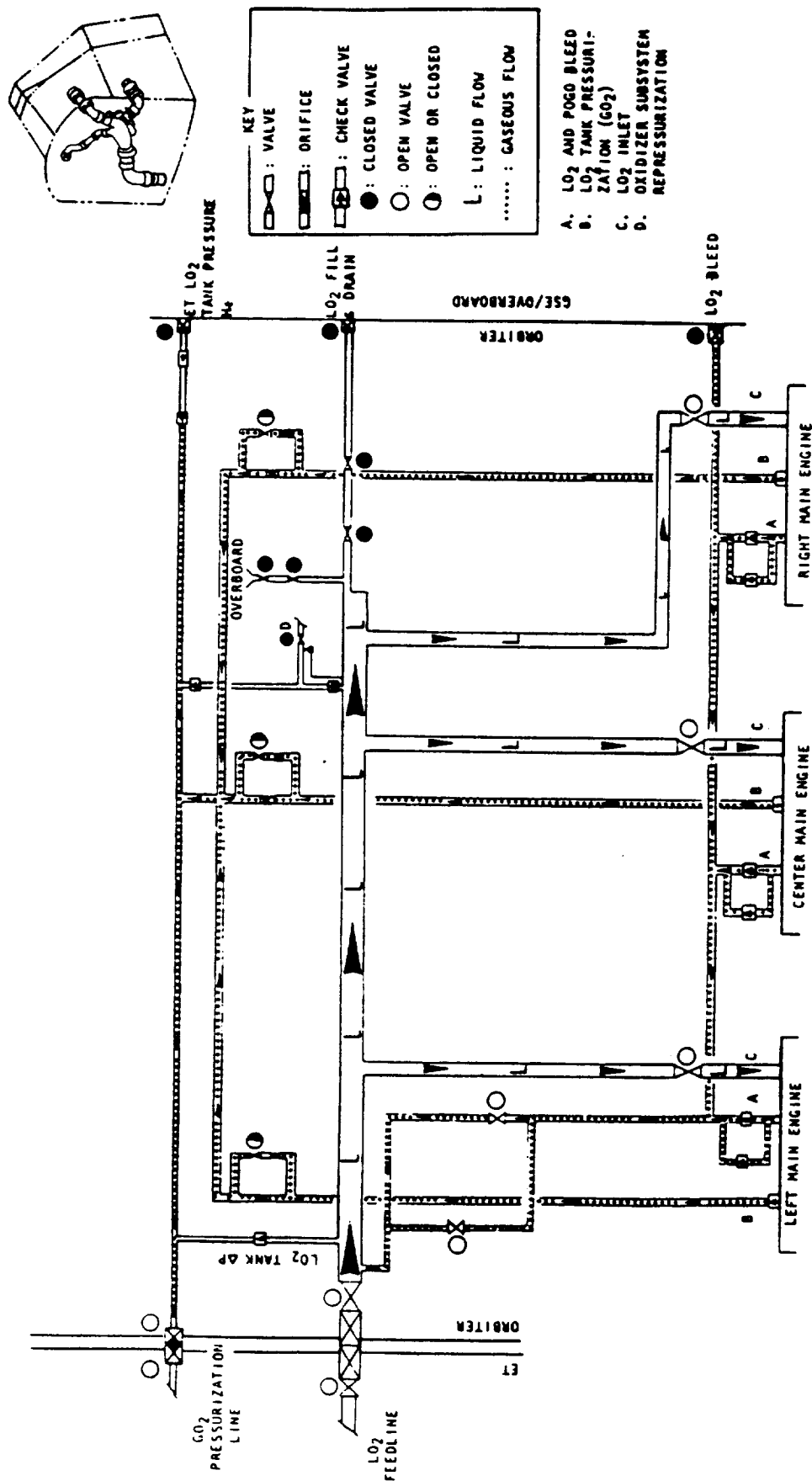


Figure 3 - PROPELLANT MANAGEMENT SUBSYSTEM OXIDIZER FLOW

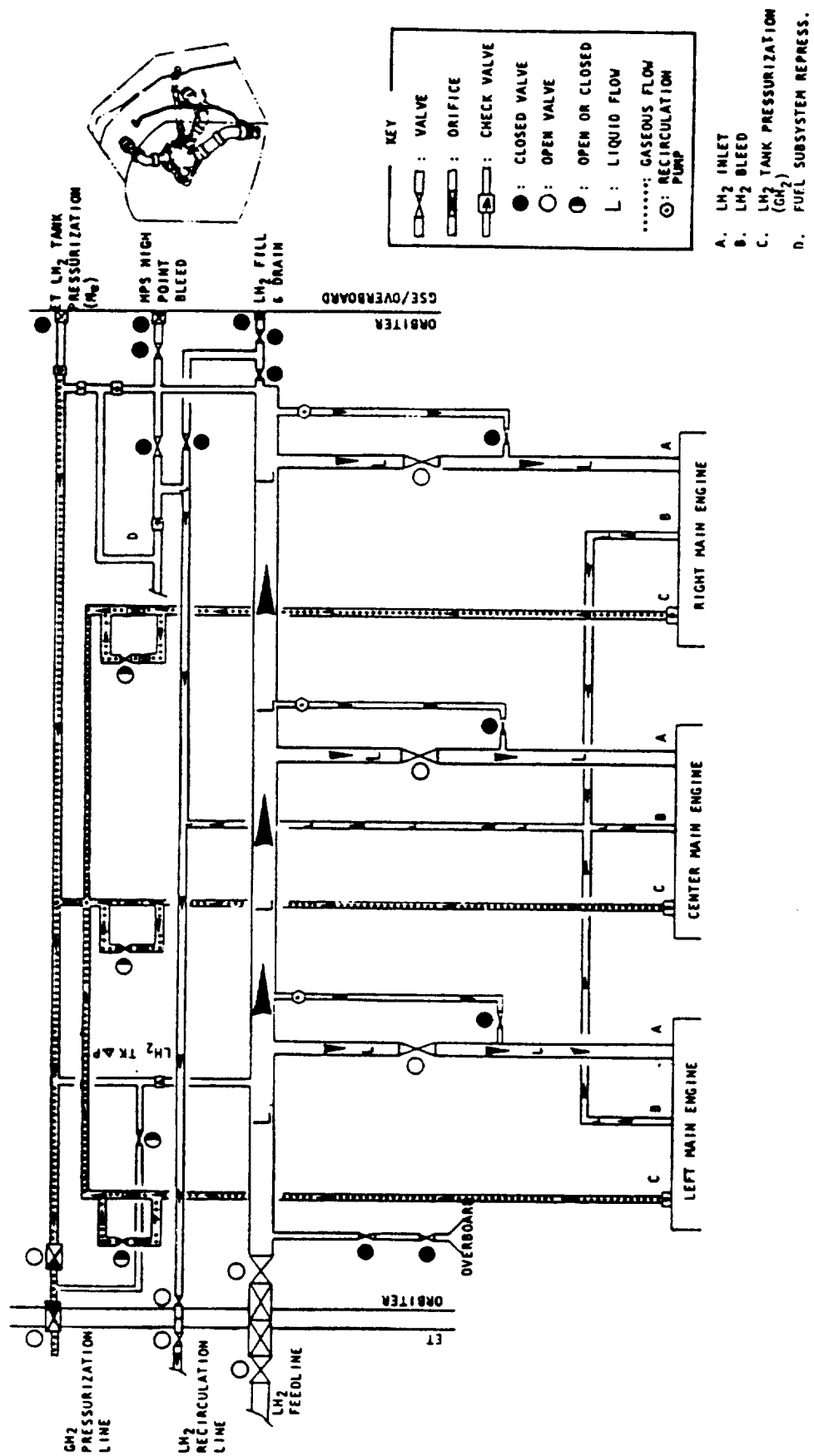


Figure 4 - PROPELLANT MANAGEMENT SUBSYSTEM FUEL FLOW

umbilicals at the feedline disconnect valve, and to either GSE liquid propellant umbilicals (prelaunch only), or overboard at the outboard fill and drain valves.

Between the feedline disconnect valves and the inboard fill and drain valves are three outlets for the three engine propellant feedlines and one outlet for the propellant feedline relief line. The LH2 feedline manifold contains an extra outlet for the LH2 Return to Launch Site (RTLIS) feedline dump line. (See paragraph 4 below.) Pressures within the LO2 and the LH2 feedline manifolds (MANF) can be monitored on the two ENG MANF meters on Panel F7 or the CRT display Guidance and Navigation Control (GNC) System (SYS) SUMM 1 Backup Flight System (BFS).

2. Engine Propellant Feedlines - There are six 12-inch diameter feedlines in the Orbiter, three for LO2 and three for LH2. Each of the LO2 engine propellant feedlines connects to the LO2 feedline manifold at one end and to the Low Pressure Oxidizer Turbopump (LPOT) inlet of one of the SSMEs at the other end. Likewise, each of the LH2 engine propellant feedlines connects to the LH2 feedline manifold at one end and to the Low Pressure Fuel Turbopump (LPFT) inlet at one of the SSMEs at the other end. There is one pre valve in each of the six engine propellant feedlines. The pre valves are designated as left, center, or right (engine) LO2 pre valve; or left, center, or right (engine) LH2 pre valve.
3. Propellant Feedline Relief Line - There are two 1-inch diameter relief lines in the Orbiter, one for LO2 and one for LH2. Each relief line connects to one of the propellant feedline manifolds at one end and to an overboard port at the other end. Each relief line contains a relief valve and a pneumatically actuated relief isolation valve. The isolation valve is mounted in series with, and upstream of, the relief valve. Flow through the relief line and relief valve is enabled by relieving closing pressure on the normally open isolation valve, allowing it to open.

The position of the relief isolation valve (2) is controlled by one of two FEEDLINE RLF ISOL switches on Panel R4. Normally these switches are left in the GPC position. With the switches (2) in this position, both relief isolation valves will be opened automatically immediately after MECO.

The purpose of the relief lines is to prevent excessive pressure build-ups, generated by heatup and expansion of the propellants in the feedline manifolds, by allowing the pressure to be vented overboard through the relief valves.

4. LH2 RTLS Feedline Dump Line - This is a single 2 inch diameter line which connects to the LH2 feedline manifold at one end and to an overboard port at the other end. (The overboard port is located on the outer skin of the left side of the Orbiter between the Orbital Maneuvering System (OMS) pod and the upper surface of the wing.) The line is used for dumping residual LH2 during an RTLS abort. In non-RTLS situations, the pilot can use the backup LH2 dump switch to open these valves. Flow through the line is controlled by two series-connected, normally closed, LH2 RTLS dump valves (one inboard, one outboard) which are mounted in the line. The LH2 RTLS dump valves are controlled automatically by GPC commands.

B. Gaseous Propellant Collection and Supply Network. The network consists of all the lines used to collect and supply gaseous propellants (GO2 and GH2) from all three SSMEs to the ET to maintain propellant tank pressure during main engine burn. (Note: This network has no major function after ET separation.) Specifically, the gaseous propellant collection and supply network consists of the following.

1. Engine ET Pressurization Output Lines - There are six 0.63-inch diameter pressurization lines in the Orbiter, three for GO2 and three for GH2. Each of the GO2 pressurization lines connects to the oxidizer heat exchanger outlet of one of the SSMEs at one end and the GO2 ET pressurization manifold at the other end. Each of the GH2 pressurization lines connects to the LPFT turbine outlet of one of the SSMEs at one end and the GH2 ET pressurization manifold at the other end. Six flow control valves are used to control ullage pressure in the two ET propellant tanks.
2. ET Pressurization Manifolds - There are two 2-inch diameter manifolds in the Orbiter, one for GO2 and one for GH2. At each end of both manifolds are self-sealing quick disconnects. The pressurization manifolds connect to the ET gaseous propellant umbilicals at one set of quick-disconnects and to the GSE helium pressurization umbilicals at the other set of quick-disconnects. The GSE helium

pressurization umbilicals (2) are used for the initial pressurization of the ET propellant tanks during prelaunch.

Each pressurization manifold contains inlets for the three engine ET pressurization output lines. (The ET GH2 pressurization manifold contains, in addition to the three inlets, an outlet for the GH2 pressurization vent line. (See paragraph 3 below.)

3. GH2 Pressurization Vent Line - This is a single line which connects to the ET GH2 pressurization manifold line at one end and to an overboard port at the other end. This line is used exclusively for vacuum inerting the GH2 pressurization lines during orbit. Flow through the line is controlled by the normally closed GH2 pressurization line vent valve which is mounted in the line. This valve is controlled by the GH2 PRESS LINE VENT switch on cockpit Panel R4.

- C. Valves - There are two basic types of valves used in the PMS: those that are pneumatically actuated and those that are electrically actuated. Pneumatically actuated valves are used where large loads are encountered, such as in the control of liquid propellant flows. Electrically actuated valves are used where lighter loads are encountered, such as in the control of gaseous propellant flows.

Pneumatically actuated valves can be further divided into two subtypes - those that require pneumatic pressure to open and close the valve (type 1) and those that are spring-loaded to one position and require pneumatic pressure to move to the other position (type 2).

The following is a list of the type 1 valves.

LH2 feedline disconnect valve
LO2 feedline disconnect valve
LH2 prevalues (3)
LO2 prevalues (3)
LH2 inboard fill/drain valve
LO2 inboard fill/drain valve
LH2 outboard fill/drain valve
LO2 outboard fill/drain valve

Each type 1 valve actuator is equipped with two electrically actuated solenoid valves. Each of the two solenoid valves controls helium pressure to either an "open" port or a "close" port on the actuator.

Energizing the solenoid valve connected to the "open" port will allow helium pressure to open the pneumatic valve. Similarly, closing of the pneumatic valve is performed by energizing the solenoid valve connected to the "close" port. (The LO2 Prevalves have four solenoids, two redundant solenoids each to control helium pressure to the "open" and to the "closed" ports.)

Removing power from a solenoid valve not only removes helium pressure from the corresponding port of the pneumatic actuator, but also allows the helium pressure trapped in that side of the actuator to vent overboard. Removing power from both solenoids allows the pneumatic valve to remain in its last commanded position.

The following is a list of the type 2 valves.

- LH2 RTLS inboard dump valve, Normally Closed (NC)
- LH2 RTLS outboard dump valve (NC)
- LH2 feedline relief shutoff valve, Normally Open (NO)
- LO2 feedline relief shutoff valve (NO)
- LO2 Pogo accumulator recirculation valve (NO)

Each type 2 valve is equipped with a single electrically actuated solenoid valve which controls helium pressure to either an "open" port or a "close" port on the actuator. Removing power from the solenoid valve removes helium pressure from the corresponding port of the pneumatic actuator and allows helium pressure trapped in that side of the actuator to vent overboard. Spring force will then take over and drive the valve to the opposite position. If the spring force drives the valve to the open position, the valve is referred to as a Normally Open (NO) valve. If the spring force drives the valve to the closed position, the valve is referred to as a Normally Closed (NC) valve.

The following is a list of the electrically actuated solenoid valves:

- H2 pressurization line vent valve (NC)
- GH2 pressurization flow control valves (3) (NO)
- GO2 pressurization flow control valves (3) (NO)

The above electrically actuated valves are spring-loaded to one position and move to the other position when power is applied. These valves are referred to as either normally open or normally closed, based on their position in the de-energized state.

3.1.3 Orbiter MPS - Helium Subsystem General Description

The helium subsystem consists of seven 4.7-ft³ helium supply tanks, three 17.3-ft³ helium supply tanks, and their associated regulators, check valves, distribution lines, and control valves (Figure 5). Four of the 4.7-ft³ helium supply tanks are located within the Orbiter aft of the payload bay area. The other three 4.7-ft³ supply tanks and the three 17.3-ft³ supply tanks are located below the payload bay liner and above the main landing gear cavity. Each of the 17.3-ft³ supply tanks is plumbed to two of the 4.7-ft³ supply tanks (one in the mid-body, the other in the aft body) to form three sets of three tanks. Each set of tanks, thus formed, normally provides helium to only one engine and for this reason is commonly referred to by the engine's designation; for example, "left engine helium." This helium is used for in-flight purges of engines, aft compartments, and provides pressure for actuating engine valves during emergency pneumatic shutdowns.

The remaining 4.7-ft³ helium supply tank (the one which is not connected to a 17.3-ft³ tank) is called the "pneumatic helium" supply tank. It normally provides pressure to actuate all of the pneumatically operated valves within the propellant management subsystem (Figure 5).

Each of the four helium supply circuits described above (three engine helium and one pneumatic helium) will operate independently until after MECO, when the three "out" helium interconnect valves will be opened, connecting all circuits to a common manifold. This interconnection can be performed manually by the crew; however, normally the GPC will automatically interconnect the circuits just before the start of the MPS propellant dump.

3.1.4 Helium Subsystem Components

The helium subsystem contains the following major components.

- A. Supply Tank - Each engine helium supply tank cluster consists of two 4.7-ft³ supply tanks and one 17.3-ft³ supply tank. One of the 4.7-ft³ tanks and the 17.3-ft³ tank are located in the mid-body area of the Shuttle under the payload bay liner, in an area originally reserved for additional Power Reactant Supply and Distribution (PRSD) cryogenic storage. The 17.3-ft³ tank is identical to that used in the OMS. The remaining 4.7-ft³ tank is located in the rear of the Shuttle, aft of the payload bay bulkhead. The single 4.7-ft³ pneumatic helium supply tank is also located in this area. Prior to lift-off, all helium supply tanks will be pressurized to a nominal value of 4500 psia.

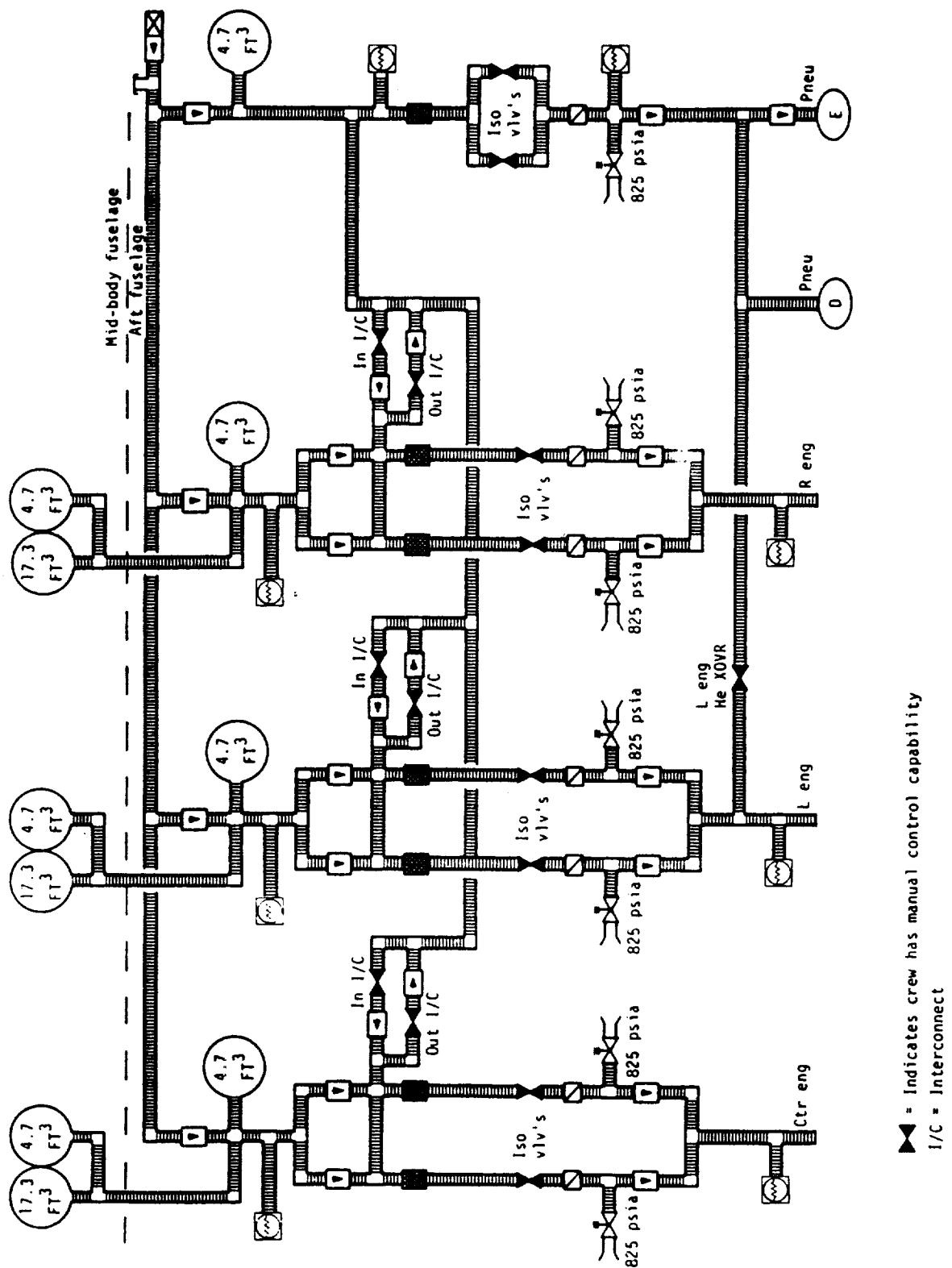
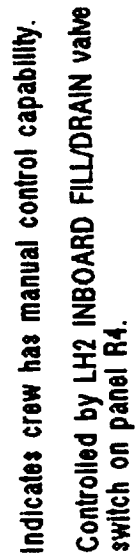


Figure 5 - HELIUM SUBSYSTEM; STORAGE AND REGULATION



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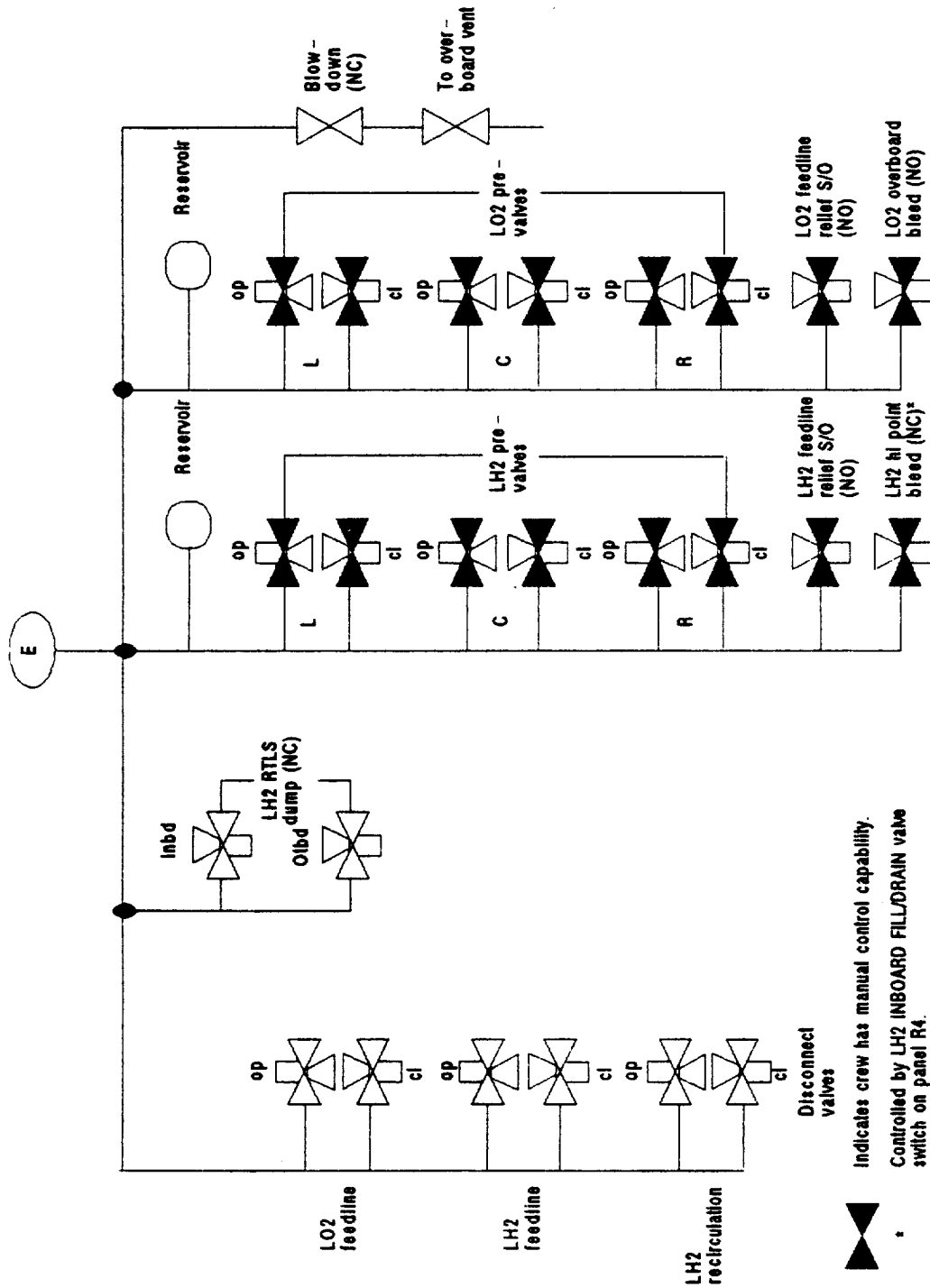


Figure 6B - PNEUMATIC HELIUM DISTRIBUTION

- B. Solenoid Actuated Valves - All of the valves in the helium subsystem are spring-loaded to one position and electrically actuated to the other position.

Valve position is controlled via electrical signals from either the GPCs or a manual switch. The crew can control only a portion of the valves through cockpit switches, the remainder are controlled automatically by the GPCs.

- C. Supply Tank Isolation Valves - There are eight supply tank isolation valves in the helium subsystem. The valves are connected in parallel to each engine helium supply tank cluster and to the pneumatic supply tank in pairs. In the case of the engine helium supply tanks, each pair of isolation valves control helium flow through one leg of a dual helium supply regulator circuit. Each helium supply circuit contains two check valves, a filter, an isolation valve, a regulator, and a relief valve.

The two isolation valves connected to the pneumatic supply tank are also connected in parallel. The rest of the corresponding helium supply circuit consists of a filter, the two isolation valves, a regulator, a relief valve, and a single check valve.

Each isolation valve (with the exception of the two pneumatic helium isolation valves) can be individually controlled by its own cockpit switch. The two pneumatic helium isolation valves are controlled by a single switch on Panel R2.

- D. Interconnect Valves - Each engine helium supply tank cluster has two interconnect valves. Each valve in the pair of interconnect valves is connected in series with a check valve. Because of the check valves, helium can flow through the interconnect valves in one direction only. The interconnect valves are oriented in such a manner that one interconnect valve controls helium flow into the circuit and the other interconnect valve controls helium flow out of the circuit. The "in" interconnect valve controls He flow into the associated engine helium distribution lines from the pneumatic helium supply tank. The "out" interconnect valve controls helium flow out of the associated engine helium supply tank cluster to the pneumatic helium distribution lines.

Each pair of interconnect valves (per engine) are controlled by a single cockpit switch. This switch has three positions: IN OPEN/OUT CLOSE, GPC, and IN CLOSE/OUT OPEN. With the switch in the IN OPEN/OUT CLOSE position, the "in" interconnect valve will be

opened and the "out" interconnect valve closed. The IN CLOSE/OUT OPEN switch position will do the reverse. With the switch in the GPC position, both valves are closed unless commanded to the open position by the GPCs. In the event of an RTLS during a normal flight the GPC will signal the "in" interconnect valve to open automatically at MECO and close automatically 20 seconds later. The "out" interconnect valve is opened automatically at the beginning of the LO2 dump and closed automatically at the end of the LH2 dump. If an engine was shut down prior to MECO, however, the corresponding "in" interconnect valve will remain closed at MECO. At any other time, placing the switch in the GPC position results in both interconnect valves closing and remaining closed.

There is an additional crossover (interconnect) valve connected downstream of the left engine helium supply regulators to the pneumatic helium distribution system. In the event of a pneumatic helium regulator failure (note - only one regulator in this line), this crossover valve would be opened, the pneumatic helium isolation valve would be closed, and the left engine helium supply would then provide regulated helium pressure through the crossover valve to the pneumatic helium distribution system. This crossover valve is controlled by it's own three-position cockpit switch. The three switch positions are labeled OPEN, GPC, and CLOSE.

- E. Manifold Pressurization Valves - (Figure 6A) - The manifold pressurization valves are located downstream of the pneumatic helium pressure regulator and are used to control the flow of helium to the propellant manifolds during nominal propellant dumps and manifold repressurization. There are four of these valves, grouped in pairs. One pair of valves controls helium pressure to the LO2 propellant manifolds, and the other pair controls helium pressure to the LH2 propellant manifolds.
- F. LH2 RTLS Dump Pressurization Valves - (Figure 6B) - The LH2 RTLS dump pressurization valves are located downstream of the pneumatic helium pressure regulator and are used to control the pressurization of the LH2 propellant manifolds during an RTLS LH2 dump. There are two of these valves, connected in series. Unlike the LH2 manifold pressurization valves, the LH2 RTLS dump pressurization valves cannot be controlled from the cockpit. During an RTLS abort, valves will be opened and closed automatically by GPC commands.

One additional difference between the nominal and the RTLS LH2 dumps is in the routing of the helium and the location at which it enters the LH2 feedline manifold. For the nominal LH2 dump, helium passes through the LH2 manifold pressurization valves and enters the feedline manifold in the vicinity of the LH2 feedline disconnect valve. For the RTLS LH2 dump, helium passes through the LH2 RTLS dump pressurization valves and enters the feedline manifold in the vicinity of the LH2 inboard fill/drain valve (on the inboard side).

- G. Pressure Regulators - Each engine helium supply tank cluster has two pressure regulators, operating in parallel. Each regulator controls pressure in one leg of a dual-redundant helium supply circuit. The pressure regulators for the helium supply tanks are set to provide outlet pressures in the range of 715 psig to 770 psig. Downstream of this regulator are two more regulators, the LH2 manifold pressure regulator and the LO2 manifold pressure regulator. These regulators are used only during MPS propellant dump and manifold repressurization. Both regulators are set to provide outlet pressures in the range of 20 to 25 psig. Flow through the regulators is controlled by the appropriate set (2) of normally closed manifold pressurization valves (Figure 6).
- H. Relief Valves - Downstream of each pressure regulator (with the exception of the two manifold repress regulators) is a relief valve. The purpose of the relief valve is to protect the downstream helium distribution lines from the overpressurization (and rupture) in the event the associated pressure regulator fails fully open. The relief valves in the helium supply circuits are set to relieve at 825 +/- 25 psig and reseal at 785 psig.

3.2 Interfaces and Locations

The MPS system hardware is located in the aft fuselage compartment behind the payload bay but forward of the main engines. The MPS system interfaces with the Orbiter's three main engines, the external tank, and the ground during prelaunch and post landing.

3.3 Hierarchy

Figure 2 illustrates the hierarchy of the MPS hardware components.

4.0 ANALYSIS RESULTS

Detailed analysis results for each of the identified failure modes are presented in Appendix C. Table I presents a summary of the failure criticalities. Further discussion of each of these subdivisions and the applicable failure modes is provided in subsequent paragraphs.

TABLE I Summary of IOA Failure Modes and Criticalities							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
LO2	53	61	11	56	43	39	263
LH2	64	30	-	25	-	64	183
Helium	12	51	19	13	27	122	244
TOTAL	129	142	30	94	70	225	690

Of these 690 failure modes analyzed, 349 were determined to be PCIs. A summary of the PCIs is presented in Table II. Appendix D contains a cross reference between each PCI and analysis worksheets in Appendix C.

TABLE II Summary of IOA Potential Critical Items						
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
LO2	53	61	11	14	7	146
LH2	64	30	-	11	-	105
Helium	12	51	19	-	16	98
TOTAL	129	142	30	25	23	349

4.1 Analysis Results - Liquid Oxygen (LO2)

Failures related to the LO2 components were analyzed. Critical failures were due to external leaks, spontaneous ignition and mechanical failures of valves.

The LO2 components were individually analyzed. Critical failures involved the loss of propellant overboard, fire in the aft fuselage and fire/explosions in the SSMEs. The LO2 manifold repressurization was the only noncritical failure in this system. One hundred twenty-nine (129) failures were identified to be PCIs.

4.2 Analysis Results - Liquid Hydrogen (LH2)

Critical failures of components involved line ruptures and flow restrictions, mechanical and electrical failures of valves and disconnects, and external leakage. One hundred five (105) failures were identified to be PCIs.

4.3 Analysis Results - Helium

Critical failures of components involved mechanical and electrical failures of valves, and external leakage. Noncritical failures involved quick disconnects' inability to mate/demate, and electrical failures of valves. Ninety-eight (98) failures were identified to be PCIs.

5.0 REFERENCES

Reference documentation available from NASA and Rockwell was used in the analysis. The documentation used included the following:

1. Main Propulsion System Workbook, 3/01/82
2. Main Propulsion System - Fluid Flows, 10/25/78
3. Shuttle Flight Operations Manual, Volume 8A, MPS, 8/31/81
4. Booster Systems Briefs, 10/01/84
5. SSME Training Data, Engine Orientation, 5/31/80
6. Instructions for Preparation of FMEA and CIL for the STS, NSTS 22206, 10/10/86
7. Space Shuttle Systems Handbook, Volumes 1-2, Revision C, DNC-5, 9/13/85
8. Integrated System Schematic, MPS, OV-099, 103, 104, 5/27/86
9. STS Mission Problem Tracking List
10. OV-099 Operational Configuration CIL, Mechanical/Fluid Systems, Book 1 of 4, 3/01/82
11. OV-099 Operational Configuration CIL, ECLSS/Power Systems, Book 2 of 4, 3/01/82
12. OV Operational Configuration CIL, Propulsion Systems, Book 3 of 4, 11/01/82
13. OV Operational Configuration CIL, Avionics Systems, Book 4 of 4, 11/01/82
14. Operations and Maintenance Requirements and Specifications, 12/17/85
15. Operations and Maintenance Requirements and Specification Document, 3/06/86
16. Problem Records, 7/22/86
17. Shuttle Orbiter OV-102 CDR, Safety Analysis Report, Volume I, Management Summary, 4/27/77
18. Shuttle Orbiter OV-102 CDR, Safety Analysis Report, Volume II, Structures Systems, 4/27/77
19. Shuttle Orbiter OV-102 CDR, Safety Analysis Report, Volume III, Mechanical Systems, 4/27/77
20. Shuttle Orbiter OV-102 CDR, Safety Analysis Report, Volume IV, Propulsion Systems, 4/27/77
21. Shuttle Orbiter OV-102 CDR, Safety Analysis Report, Volume V, Power System, 4/27/77
22. Shuttle Orbiter OV-102 CDR, Safety Analysis Report, Volume VII, ECLSS, 4/27/77
23. Shuttle Orbiter OV-102 CDR, Safety Analysis Report, Volume VIII, Crew Station Systems, 4/27/77
24. FMEA - Lightweight and Heavyweight Tanks, 7/20/81
25. Integrated System Schematic, OV-102, MPS, 10/26/79
26. Crew Software Interface, CSI 2102, 9/30/84
27. Rockwell International Component Specifications:
 - a. MC271-0073, LH2 Engine Feed Line Assembly, 10/26/83
 - b. MC271-0074, LO2 Engine Feed Line Assembly, 11/07/83
 - c. MC271-0075, LH2 Line Assembly, 5/28/80
 - d. MC271-0076, LH2/LO2 Fill & Drain Line Assembly, 12/02/83

- e. MC276-0003, 1 Inch GHE & GN2 Disconnect, 1/11/85
- f. MC276-0004, 1.5 Inch LO2/LH2 Disconnect, 1/04/85
- g. MC276-0005, LO2/LH2 Orbiter to Ground Fill & Drain Disconnect, 4/18/83
- h. MC276-0032, Test Point Couplings, 2/10/75
- i. MC280-0017, H2 & O2 Pressurant Flow Control Valve 4/11/84
- j. MC281-0030, LH2 Recirculation Pump Assembly, 4/12/82
- k. MC284-0389, LH2/LO2 Orbiter to Tank Feed System Disconnect, 2/01/82
- l. MC284-0390, LH2 Orbiter to Tank Recirculation Disconnect, 7/27/79
- m. MC284-0391, GH2/GO2 Orbiter to Tank Disconnect, 10/25/79
- n. MC284-0395, LO2/LH2 1.5/2 Inch Shutoff Valve, 6/27/79
- o. MC284-0396, Propellant Shutoff Prevalve, 7/24/82
- p. MC284-0397, Propellant Fill & Drain Valve, 6/22/84
- q. MC284-0403, Two Way Solenoid Valve, 6/24/80
- r. MC284-0406, LO2/LH2 Relief Shutoff Valve, 5/05/76
- s. ME284-0479, Engine Isolation Check Valve, 8/20/80
- t. MC284-0501, Engine Isolation Check Valve, 1/31/83
- u. MC284-0515, Dual Check Valve, 11/11/82
- v. MC432-0205, LO2/LH2 Level Point Sensor, 4/15/81
- w. ME284-0472, HE Check Valve, 4/04/80
- x. MC284-0404, 3 Way HE Solenoid Valve, 4/01/75
- y. MC284-0533, HE Regulator, 11/13/79
- z. MC284-0399, LO2 Manif Repress Regulator
- aa. MC284-0398, HE Relief Valve, 12/14/77
- bb. MC282-0082, HE Supply Tank, 12/14/76
- cc. MC282-0070, LO2 Prevalve Pneu Accumulator, 10/31/75
- dd. ME276-0032, Test Point Coupling, 2/10/75
- ee. ME284-0474, LH2 3/8 Inch Relief Valve, 9/10/74
- ff. ME286-0056, HE Supply Filter, 11/04/74
- gg. VO70-451756, Pneu HE Panel 4 Test Port
- hh. VO70-415532, LH2 Repress Reg Outlet Test Port, 12/08/75
- ii. VO70-415568, LO2 Repress Reg Outlet Test Port, 5/17/76
- jj. VO70-415585, Helium Fill Disc. Check Valve Test Port, 4/16/76
- kk. VO70-415446, LO2 Prepress Disc. Check Valve Test Port, 3/11/76
- ll. VO70-415790, HE Supply Test Port, 4/13/78
- mm. VO70-415133, Check Valve CV24 Leakage Test Port, 8/21/80
- nn. VO70-415545, LH2 Feed Manif RTLS Repress Orifice, 12/19/75
- oo. VO70-414548, LH2 Pressurization System Test Port Fittings, 3/25/76
- pp. VO70-415468, LO2 Relief System Test Port Fitting, 7/13/77
- qq. VO70-415552, GO2 Pressurization Manifold Orifice Assembly, 3/05/767

APPENDIX A ACRONYMS

AFV	-	Anti-Flood Valve
ASI	-	Augmented Spark Igniter
ATVC	-	Ascent Thrust Vector Control
CCV	-	Chamber Coolant Valve
CCVA	-	Chamber Coolant Valve Assembly
EIU	-	Engine Interface Unit
EMR	-	Engine Mixture Ratio
ET	-	External Tank
FBV	-	Fuel Bleed Valve
FPB	-	Fuel Preburner
FPL	-	Full Power Level
FPOV	-	Fuel Preburner Oxidizer Valve
GCV	-	Gaseous Oxygen Control Valve
GH2	-	Gaseous Hydrogen
GHe	-	Gaseous Helium
GN2	-	Gaseous Nitrogen
GND	-	Ground
GO2	-	Gaseous Oxygen
GSE	-	Ground Support Equipment
H2	-	Hydrogen
He	-	Helium
HEX	-	Heat Exchanger
HGM	-	Hot Gas Manifold
HPFT	-	High Pressure Fuel Turbopump
HPOT	-	High Pressure Oxidizer Turbopump
HPV	-	Helium Precharge Valve
I/C	-	Interconnect
ISP	-	Specific Impulse
LH2	-	Liquid Hydrogen
LO2	-	Liquid Oxygen
LOX	-	Liquid Oxygen
LPFT	-	Low Pressure Fuel Turbopump
LPOT	-	Low Pressure Oxidizer Turbopump
LPS	-	Launch Processor System Launch Processing System
MANF	-	Manifold
MCC	-	Main Combustion Chamber
ME	-	Main Engine
MEC	-	Master Events Controller
MECO	-	Main Engine Cutoff
MFV	-	Main Fuel Valve
MOV	-	Main Oxidizer Valve
MPL	-	Minimum Power Level
MPS	-	Main Propulsion System
MVA	-	Main Valve Actuator
NC	-	Normally Closed
NO	-	Normally Open
NPSP	-	Net Positive Suction Pressure
OBV	-	Oxidizer Bleed Valve
OPB	-	Oxidizer Preburner

OPOV	-	Oxidizer Preburner Oxidizer Valve
PAV	-	Pressure Actuated Valve
P/B	-	Preburner
PBVA	-	Propellant Bleed Valve Assembly
Pc	-	Chamber Pressure
PCI	-	Potential Critical Item
PCV	-	Purge Check Valves
PMS	-	Propellant Management Subsystem
POP	-	Preburner Oxidizer Pump
RIV	-	Recirculation Isolation Valve
RPC	-	Remote Power Controller
RPL	-	Rated Power Level
SRB	-	Solid Rocket Booster
SSME	-	Space Shuttle Main Engine
SSMEC	-	SSME Controller

APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

- B.1 Definitions**
- B.2 Project Level Ground Rules and Assumptions**
- B.3 Subsystem-Specific Ground Rules and Assumptions**

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.1 Definitions

Definitions contained in NSTS 22206, Instructions For Preparation of FMEA/CIL, 10 October 1986, were used with the following amplifications and additions.

INTACT ABORT DEFINITIONS:

RTLS - begins at transition to OPS 6 and ends at transition to OPS 9, post-flight

TAL - begins at declaration of the abort and ends at transition to OPS 9, post-flight

AOA - begins at declaration of the abort and ends at transition to OPS 9, post-flight

ATO - begins at declaration of the abort and ends at transition to OPS 9, post-flight

CREDIBLE (CAUSE) - an event that can be predicted or expected in anticipated operational environmental conditions. Excludes an event where multiple failures must first occur to result in environmental extremes

CONTINGENCY CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

EARLY MISSION TERMINATION - termination of onorbit phase prior to planned end of mission

EFFECTS/RATIONALE - description of the case which generated the highest criticality

HIGHEST CRITICALITY - the highest functional criticality determined in the phase-by-phase analysis

MAJOR MODE (MM) - major sub-mode of software operational sequence (OPS)

MC - Memory Configuration of Primary Avionics Software System (PASS)

MISSION - assigned performance of a specific Orbiter flight with payload/objective accomplishments including orbit phasing and altitude (excludes secondary payloads such as GAS cans, middeck P/L, etc.)

MULTIPLE ORDER FAILURE - describes the failure due to a single cause or event of all units which perform a necessary (critical) function

OFF-NOMINAL CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

OPS - software operational sequence

PRIMARY MISSION OBJECTIVES - worst case primary mission objectives are equal to mission objectives

PHASE DEFINITIONS:

PRELAUNCH PHASE - begins at launch count-down Orbiter power-up and ends at moding to OPS Major Mode 102 (liftoff)

LIFTOFF MISSION PHASE - begins at SRB ignition (MM 102) and ends at transition out of OPS 1 (Synonymous with ASCENT)

ONORBIT PHASE - begins at transition to OPS 2 or OPS 8 and ends at transition out of OPS 2 or OPS 8

DEORBIT PHASE - begins at transition to OPS Major Mode 301 and ends at first main landing gear touchdown

LANDING/SAFING PHASE - begins at first main gear touchdown and ends with the completion of post-landing safing operations

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in NSTS 22206, Instructions for Preparation of FMEA/CIL, 10 October 1986, was employed with the following amplifications and additions.

1. The operational flight software is an accurate implementation of the Flight System Software Requirements (FSSRs).

RATIONALE: Software verification is out-of-scope of this task.

2. After liftoff, any parameter which is monitored by system management (SM) or which drives any part of the Caution and Warning System (C&W) will support passage of Redundancy Screen B for its corresponding hardware item.

RATIONALE: Analysis of on-board parameter availability and/or the actual monitoring by the crew is beyond the scope of this task.

3. Any data employed with flight software is assumed to be functional for the specific vehicle and specific mission being flown.

RATIONALE: Mission data verification is out-of-scope of this task.

4. All hardware (including firmware) is manufactured and assembled to the design specifications/drawings.

RATIONALE: Acceptance and verification testing is designed to detect and identify problems before the item is approved for use.

5. All Flight Data File crew procedures will be assumed performed as written, and will not include human error in their performance.

RATIONALE: Failures caused by human operational error are out-of-scope of this task.

6. All hardware analyses will, as a minimum, be performed at the level of analysis existent within NASA/Prime Contractor Orbiter FMEA/CILs, and will be permitted to go to greater hardware detail levels but not lesser.

RATIONALE: Comparison of IOA analysis results with other analyses requires that both analyses be performed to a comparable level of detail.

7. Verification that a telemetry parameter is actually monitored during AOS by ground-based personnel is not required.

RATIONALE: Analysis of mission-dependent telemetry availability and/or the actual monitoring of applicable data by ground-based personnel is beyond the scope of this task.

8. The determination of criticalities per phase is based on the worst case effect of a failure for the phase being analyzed. The failure can occur in the phase being analyzed or in any previous phase, whichever produces the worst case effects for the phase of interest.

RATIONALE: Assigning phase criticalities ensures a thorough and complete analysis.

9. Analysis of wire harnesses, cables, and electrical connectors to determine if FMEAs are warranted will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

10. Analysis of welds or brazed joints that cannot be inspected will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

11. Emergency system or hardware will include burst discs and will exclude the EMU Secondary Oxygen Pack (SOP), pressure relief valves and the landing gear pyrotechnics.

RATIONALE: Clarify definition of emergency systems to ensure consistency throughout IOA project.

APPENDIX B

B.3 SUBSYSTEM SPECIFIC GROUND RULES AND ASSUMPTIONS

The IOA was performed to the component/assembly level of the subsystem of the MPS. The analysis considered the worst case effects of the hardware/functional failure on the subsystem, mission, and crew/vehicle safety.

1. All like and unlike redundancy will be considered in determining functional criticality. The MPS function is to provide delta V for the vehicle to reach orbit. Since loss of one main engine during the early part of ascent requires a mission abort, any failure that results in the loss of one main engine will be considered loss of mission (Crit 2). Since, for most of the ascent, two engines are required for a successful abort, loss of two or three engines will be considered loss of life/vehicle (Crit 1).

RATIONALE: These failure modes are directly applicable to worst case MPS subsystem component analyses.

2. Only MPS Orbiter items will be analyzed for the MPS interface to the Ground, External Tank, and the Main Engines.

RATIONALE: Non-orbiter program hardware are not within the scope of this task.

3. Aborts are assumed to be caused by loss of an engine. Any failure within a component that can shut down an engine could leave only one engine in operation and therefore could lead to loss of vehicle (Crit 1).

RATIONALE: This failure mode is directly applicable to worst case MPS subsystem component analysis.

4. Undesignated or "Mil-Spec" lines in the MPS system will not be considered as failure sources except at unwelded component joints. The components will be identified from generic MPS system schematic drawing(s) VS70-41500X. The component connection configurations (welded, screwed, flanged) will be determined from the appropriate RI Specification drawing. Failure modes of the unwelded lines will not be considered, unless different from the failure modes of the component(s) or system to which they are attached.

RATIONALE: Undesignated lines do not have any reference documentation, and they are out of the scope of this task.

APPENDIX C DETAILED ANALYSIS

This section contains the IOA analysis worksheets generated during the analysis of this subsystem. The information on these worksheets is intentionally similar to the NASA FMEAs. Each of these sheets identifies the hardware item being analyzed, and parent assembly, as well as the function. For each failure mode, the possible causes are outlined, and the assessed hardware and functional criticality for each mission phase is listed, as described in the NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. Finally, effects are entered at the bottom of each sheet, and the worst case criticality is entered at the top.

LEGEND FOR IOA ANALYSIS WORKSHEETS

Hardware Criticalities:

- 1 = Loss of life or vehicle
- 2 = Loss of mission or next failure of any redundant item (like or unlike) could cause loss of life/vehicle
- 3 = All others

Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission.

Redundancy Screen A:

- 1 = Is Checked Out PreFlight
- 2 = Is Capable of Check Out PreFlight
- 3 = Not Capable of Check Out PreFlight
- NA = Not Applicable

Redundancy Screens B and C:

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

APPENDIX C
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INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 1001 ABORT: 2/1R

ITEM: GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) 02 SUBSYSTEM
- 3) 02 TANK PRESS
- 4) GO2 PRESSURE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0003,0023

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE SUPPLIES GO2 FROM A SSME TO PRESSURIZE THE ET LO2 TANK. THIS ULLAGE PRESSURE IS NECESSARY FOR EFFICIENT OPERATION OF THE SSMEs (THE PROPELLANT WILL RUN OUT). THE LOSS OF ALL REDUNDANCY DURING AN ABORT WILL RESULT IN THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-02004C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: /NA
MDAC ID: 1002 ABORT: 1/1

ITEM: GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) 02 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	/NA	TAL:	1/1
ONORBIT:	/NA	AOA:	1/1
DEORBIT:	/NA	ATO:	1/1
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0003,0023

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE PREVENTS THE LOSS OF GO2 USED TO PRESSURIZE THE ET LO2 TANK THROUGH A SHUT DOWN SSME (TWO SSMEs RUNNING IS AN ABORT CASE). THE LOSS OF ULLAGE PRESSURE THROUGH THIS VALVE CAN CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1003 ABORT: 1/1

ITEM: GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0003,0023

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE SUPPLIES GO2 FROM A SSME TO PRESSURIZE THE ET LO2 TANK.

A GO2 LEAK IS A FIRE/EXPLOSION HAZARD (LOSS OF VEHICLE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1004 ABORT: /NA

ITEM: GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19 20)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) 02 SUBSYSTEM
- 3) LO2 SSME INTERFACE
- 4) GO2 PRESSURE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0003,0023

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

IF THIS VALVE IS OPEN DURING THE PRELAUNCH PHASE, HELIUM SUPPLIED FROM THE GROUND TO PRESSURIZE THE ET LO2 TANK CAN ENTER THE SSME AND RUPTURE THE HEAT EXCHANGER. THE RESULT CAN BE A FIRE/EXPLOSION IN THE SSME. (LOSS OF VEHICLE)

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C7

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1005 ABORT: 1/1

ITEM: GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 SSME INTERFACE
- 4) GO2 PRESSURE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0003,0023

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE LAUNCH WILL BE DELAYED IF THIS VALVE DOES NOT OPEN BEFORE LIFTOFF.

IF THE CHECK VALVE DOES NOT OPEN, THE PRESSURE CAUSED BY THE TRAPPED GO2 WILL RUPTURE THE HEAT EXCHANGER. THE RESULT CAN BE A FIRE/EXPLOSION IN THE SSME. (LOSS OF VEHICLE)

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C7

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1006 ABORT: 1/1

ITEM: GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) 02 SUBSYSTEM
- 3) LO2 SSME INTERFACE
- 4) GO2 PRESSURE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0003,0023

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE CAN SUPPLY ENOUGH ENERGY TO START THE VALVE ON FIRE. THIS IS A PURE 02 ATMOSPHERE EFFECT.

THE FIRE COULD SPREAD CAUSING A LARGER FIRE/EXPLOSION IN THE SSME. (LOSS OF VEHICLE)

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; PROBLEM REPORT NO AC8335-01

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1011 ABORT: /NA

ITEM: LO2 TANK PRE-PRESS CHECK VALVE (CV16)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) 02 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) LO2 TANK PRE-PRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

IF THIS CHECK VALVE FAILS TO OPEN DURING PRELAUNCH, THE ET LO2 TANK WILL NOT BE PRESSURIZED. THE LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 1013 ABORT: 1/1

ITEM: LO2 TANK PRE-PRESS CHECK VALVE (CV16)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) LO2 TANK PRE-PRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THE VALVE CAN SUPPLY ENOUGH ENERGY TO START THE VALVE ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT. (FIRE HAZARD)
BURN THROUGH OF THIS VALVE WILL CAUSE LOSS OF ULLAGE PRESSURE. THE PROPELLENT WILL RUN OUT (LESS EFFICIENT SSME OPERATIONS).
THE VEHICLE WILL BE LOST IF THIS HAPPENS DURING AN ABORT.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; NO PROBLEM REPORT NO. AC8335-01; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1014 ABORT: 1/1

ITEM: LO2 TANK PRE-PRESS CHECK VALVE (CV16)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) LO2 TANK PRE-PRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THE VALVE CAN SUPPLY ENOUGH ENERGY TO START THE VALVE ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT. THE VEHICLE WILL BE LOST IF THE FIRE SPREADS TO A SSME, CAUSING A LARGER FIRE/EXPLOSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; NO PROBLEM REPORT NO. AC8335-01; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1021 ABORT: 1/1

ITEM: LO2 BLEED CHECK VALVE (CV31, 33, 35)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) Pogo SUPPRESSION
- 4) LO2 BLEED CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0515-0002,0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THESE VALVES SUPPLY LO2 TO THE POGO SUPPRESSION SYSTEM.
FAILURE OF THE POGO SUPPRESSION SYSTEM ON ONE OR MORE ENGINES
COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF
UNPREDICTABLE AMPLITUDE WHICH CAN LEAD TO THE LOSS OF THE
VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-
0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	1022	ABORT:	2/1R

ITEM: LO2 BLEED CHECK VALVE (CV31, 33, 35)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 BLEED CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0515-0002,0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THIS VALVE TO OPEN DURING THE DUMP WILL LEAVE LO2 TRAPPED IN A SSME. LO2 TRAPPED IN TWO OR THREE SSMEs WILL VIOLATE THE AFT CG LIMIT. THEREFORE LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF THE VEHICLE DURING LANDING.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 1023 ABORT: 2/1R

ITEM: LO2 BLEED CHECK VALVE (CV31, 33, 35)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 SSME INTERFACE
- 4) LO2 BLEED CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0515-0002,0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF A LO2 BLEED CHECK VALVE WILL CAUSE LO2 PUMP CAVITATION
LEADING TO SSME SHUTDOWN.
THE LOSS OF ALL REDUNDANCY DURING AN ABORT CAN LEAD TO THE LOSS
OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-
0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1024	ABORT:	1/1

ITEM: LO2 BLEED CHECK VALVE (CV31, 33, 35)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 SSME INTERFACE
- 4) LO2 BLEED CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0515-0002,0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

A FAILURE OF THIS VALVE TO REMAIN CLOSED DURING ENGINE OPERATION COULD CAUSE RUPTURE OF THE ENGINE AND/OR ORBITER LO2 BLEED LINE. THE RESULTING FIRE/EXPLOSION WILL DESTROY THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/10/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	/NA
MDAC ID:	1025	ABORT:	1/1

ITEM: LO2 BLEED CHECK VALVE (CV31, 33, 35)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROPELLANT FEED
- 4) LO2 BLEED CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	/NA	TAL:	1/1
ONORBIT:	/NA	AOA:	1/1
DEORBIT:	/NA	ATO:	1/1
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0515-0002,0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE PREVENTS THE LOSS OF LO2 THROUGH A SHUTDOWN SSME (TWO SSMEs RUNNING IS AN ABORT CASE). THIS LOSS OF LO2 CAN CAUSE THE LOSS OF THE VEHICLE (NOT ENOUGH PROPELLANT TO FINISH THE ABORT). THE LO2 LOST THROUGH THE SHUTDOWN SSME IS FROM THE POGO SUPPRESSION SYSTEM. FAILURE OF THIS POGO SUPPRESSION SYSTEM CAN ALSO LEAD TO THE DESTRUCTION OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	1026	ABORT:	2/1R

ITEM: LO2 BLEED CHECK VALVE (CV31, 33, 35)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROPELLANT FEED
- 4) LO2 BLEED CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/2R	TAL:	2/1R
ONORBIT:	2/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0515-0002,0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS CASE APPLIES FROM AFTER MECO AND BEFORE THE MPS DUMP. THE UNLIKE REDUNDANT PART IS THE PREVALVE RELIEF VALVE. THE LOSS OF ALL REDUNDANCY MAY CAUSE THE PROPELLANT FEED LINE (BETWEEN THE PREVALVE AND THE SSME) TO RUPTURE.

THE RESULTING OVERPRESSURIZATION OF THE AFT FUSELAGE WILL CAUSE THE LOSS OF THE MISSION IN THE ONORBIT MISSION PHASES AND THE LOSS OF THE VEHICLE DURING THE DEORBIT MISSION PHASE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1027 ABORT: /NA

ITEM: LO2 BLEED CHECK VALVE (CV31, 33, 35)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) FILL & DRAIN
- 4) LO2 BLEED CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0515-0002,0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS CHECK VALVE MUST BE CLOSED PRIOR TO SSME IGNITION. FAILURE
WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

**INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	1031	ABORT:	2/1R

ITEM: GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURE FLOW CONTROL VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0018,0024,0028

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

TWO OF THE THREE (ONE FOR EACH SSME) VALVES ARE NECESSARY TO PRESSURIZE THE ET LO2 TANK. THE ET LO2 TANK ULLAGE PRESSURE IS NECESSARY FOR EFFICIENT OPERATION OF THE SSMEs (NOT ENOUGH PROPELLENT TO FINISH THE MISSION).

FLOW THROUGH BOTH ORIFICES IS NECESSARY FOR PROPER OPERATION OF THIS VALVE. CONTAMINATE PARTICLES CAN CLOG ONE AND/OR BOTH ORIFICES IN THIS VALVE. THE LOSS OF ALL REDUNDANCY DURING AN ABORT CAN LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; MPS 2102; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	1032	ABORT:	2/1R

ITEM: GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURE FLOW CONTROL VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0018,0024,0028

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

TWO OF THE THREE (ONE FOR EACH SSME) VALVES ARE NECESSARY TO PRESSURIZE THE ET LO2 TANK. THE ET LO2 TANK ULLAGE PRESSURE IS NECESSARY FOR EFFICIENT OPERATION OF THE SSMES. GO2 FLOW THROUGH THIS VALVE IS NECESSARY TO PRESSURIZE THE ET LO2 TANK. THE LOSS OF ALL REDUNDANCY DURING AN ABORT CAN CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/1R
MDAC ID: 1033 ABORT: 3/1R

ITEM: GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURE FLOW CONTROL VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0018,0024,0028

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THESE VALVES TO CLOSE COULD OVERPRESSURIZE THE ET LO2 TANK. THE ET LO2 TANK FAILURE WILL CAUSE THE LOSS OF THE VEHICLE IF THE ET LO2 TANK PRESSURE RELIEF VALVES ALSO FAIL (SECOND ORDER FAILURE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 1034 ABORT: 1/1

ITEM: GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURE FLOW CONTROL VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0018,0024,0028

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THE VALVE CAN SUPPLY ENOUGH ENERGY TO START THE VALVE ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT. (FIRE HAZARD)
BURN THROUGH OF THIS VALVE WILL CAUSE THE LOSS OF ULLAGE PRESSURE. THE PROPELLENT CAN RUN OUT (LESS EFFICIENT SSME OPERATIONS). (LOSS OF VEHICLE DURING AN ABORT)

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; MPS 2102; SEIFASSMEO SD75-SH-0200C; PROBLEM REPORT NO AC8335-01

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1035 ABORT: 1/1

ITEM: GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) GO2 PRESSURE FLOW CONTROL VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0018,0024,0028

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THE VALVE CAN SUPPLY ENOUGH ENERGY TO START THE VALVE ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT. (FIRE HAZARD)
THE VEHICLE WILL BE LOST IF THE FIRE SPREADS TO A SSME CAUSING A LARGER FIRE/EXPLOSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; PROBLEM REPORT NO AC8335-01

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1041	ABORT:	/NA

ITEM: LO2 FEED (ORB/ET) DISCONNECT (PD1)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 FEED (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0511,0521,0161

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE MUST BE OPEN TO LOAD LO2 INTO THE ET. FAILURE OF THIS VALVE WILL PREVENT THE LOADING OF LO2 INTO THE ET. THE SUDDEN CLOSING OF THIS VALVE DURING FAST FILL WOULD RESULT IN A PRESSURE SPIKE.

THE WORST CASE IS RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1042 ABORT: /NA

ITEM: LO2 FEED (ORB/ET) DISCONNECT (PD1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 FEED (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0511,0521,0161

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THIS DISCONNECT FROM THE GROUND TO THE ET.
LEAKAGE AT THE ORBITER/ET INTERFACE CAN SPRAY LO2 ON THE ORBITER
TPS, DAMAGING THE TILES.
LEAKAGE INSIDE THE ORBITER IS A FIRE/EXPLOSION HAZARD (LOSS OF
VEHICLE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; V070-415203

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1043 ABORT: 1/1

ITEM: LO2 FEED (ORB/ET) DISCONNECT (PD1)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEED (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	1/1	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0511,0521,0161

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THIS VALVE TO FEED THE SSMEs. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME SHUT DOWN, UNCONTAINED SSME DAMAGE AND FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 1044 ABORT: 3/3

ITEM: LO2 FEED (ORB/ET) DISCONNECT (PD1)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEED (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0511,0521,0161

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE IS CLOSED AFTER MECO TO PREVENT OUTGASSING IN THE ONORBIT PHASE. THIS OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE FAILURE OF THIS VALVE WILL CAUSE THE LOSS OF THE MISSION.

THIS VALVE IS ALSO CLOSED TO PREVENT CONTAMINATION OF THE MPS DURING/AFTER ENTRY.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1045	ABORT:	1/1

ITEM: LO2 FEED (ORB/ET) DISCONNECT (PD1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEED (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0511,0521,0161

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKING LO2 IS A FIRE/EXPLOSION HAZARD (LOSS OF VEHICLE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; V070-415203

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 1046 ABORT: 3/3

ITEM: LO2 FEED (ORB/ET) DISCONNECT (PD1)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 ET INTERFACE
- 4) LO2 FEED (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0511,0521,0161

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE IS CLOSED FOR ET SEPARATION TO LIMIT MOVEMENT OF THE ET (CAUSED BY THE BOILING LO2) DURING SEPARATION. FAILURE OF THIS VALVE WILL DELAY ET SEPARATION UNTIL TANK PRESSURE HAS DECAYED TO SAFE PRESSURE LEVEL.

OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE THIS FAILURE COULD CAUSE THE LOSS OF MISSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFAETO SD75-SH-0130

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1051 ABORT: /NA

ITEM: GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN, EXTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) GO2 PRESSURIZATION (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS DISCONNECT PASSES GAS (HE FROM GROUND SUPPORT AND GO2 FROM THE SSME HEAT EXCHANGERS) TO PRESSURIZE THE ET LO2 TANK. IF THE ET LO2 TANK IS NOT AT THE REQUIRED ULLAGE PRESSURE, THE LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 1052 ABORT: 1/1

ITEM: GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURIZATION (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS DISCONNECT PASSES GO2 TO PRESSURIZE THE ET LO2 TANK. THE ET LO2 TANK ULLAGE PRESSURE IS NECESSARY FOR EFFICIENT OPERATION OF THE SSMES. THIS LOSS OF ULLAGE PRESSURE WILL RESULT IN NOT ENOUGH PROPELLANT TO FINISH THE MISSION. IF THIS FAILURE OCCURS DURING THE LIFTOFF MISSION PHASE, THE MISSION WILL BE LOST. IF THIS FAILURE OCCURS DURING AN ABORT, THE VEHICLE MAY BE LOST.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1053	ABORT:	1/1

ITEM: GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURIZATION (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	1/1	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS DISCONNECT PASSES GO2 TO PRESSURIZE THE ET LO2 TANK. THE ET LO2 TANK ULLAGE PRESSURE IS NECESSARY FOR EFFICIENT OPERATION OF THE SSMEs (NOT ENOUGH PROPELLANT TO FINISH THE MISSION). A LO2 LEAK IS A FIRE/EXPLOSION HAZARD (LOSS OF VEHICLE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; V070-415404

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 1054 ABORT: 1/1

ITEM: GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURIZATION (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THIS PART CAN SUPPLY ENOUGH ENERGY TO START THE PART ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT. (FIRE HAZARD)
THE BURN THROUGH OF THIS VALVE WILL CAUSE THE LOSS OF THE ET LO2 TANK ULLAGE PRESSURE. THE PROPELLENT WILL RUN OUT (LESS EFFICIENT SSME OPERATIONS). (LOSS OF VEHICLE DURING AN ABORT)

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; PROBLEM REPORT NO. AC8335-01

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1055	ABORT:	1/1

ITEM: GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) GO2 PRESSURIZATION (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THIS PART CAN SUPPLY ENOUGH ENERGY TO START THE PART ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT.
THE VEHICLE WILL BE LOST IF THE FIRE SPREADS TO A SSME CAUSING A LARGER FIRE/EXPLOSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; PROBLEM REPORT NO. AC8335-01

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	1056	ABORT:	3/3

ITEM: GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 ET INTERFACE
- 4) GO2 PRESSURIZATION (ORB/ET) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THIS VALVE TO CLOSE WILL RESULT IN CONTAMINATION OF THE MPS DURING THE DEORBIT AND LANDING MISSION PHASES.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFAETO SD75-SH-0130

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1061 ABORT: /NA

ITEM: LO2 TANK PRE-PRESS (ORB/GND) DISC (PD9)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN, EXTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) FILL & DRAIN
- 4) LO2 TANK PRE-PRESS (ORB/GND) DISC
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE ET LO2 TANK IS PRESSURIZED WITH GROUND SUPPORT HE THROUGH
THIS DISCONNECT. IF THE ET LO2 TANK IS NOT PRESSURIZED, THE
LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1062 ABORT: /NA

ITEM: LO2 TANK PRE-PRESS (ORB/GND) DISC (PD9)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) GROUND INTERFACE
- 4) LO2 TANK PRE-PRESS (ORB/GND) DISC
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS CHECK VALVE PREVENTS THE LOSS OF THE ET LO2 TANK ULLAGE
PRESSURE THROUGH THE DISCONNECT. THE LAUNCH WILL BE DELAYED IF
THE ET LO2 TANK PRESSURE FALLS BELOW LIMITS.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	1063	ABORT:	2/1R

ITEM: LO2 TANK PRE-PRESS (ORB/GND) DISC (PD9)
FAILURE MODE: FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) LO2 TANK PRE-PRESS (ORB/GND) DISC
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE ET LO2 TANK ULLAGE PRESSURE IS NECESSARY FOR THE EFFICIENT OPERATION OF THE SSMES (NOT ENOUGH PROPELLANT LEFT TO FINISH THE MISSION).

THE LOSS OF ALL REDUNDANCY DURING THE LIFTOFF MISSION PHASE WILL CAUSE THE LOSS OF THE MISSION. THE LOSS OF ALL REDUNDANCY DURING AN ABORT MAY CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1064 ABORT: 2/1R

ITEM: LO2 TANK PRE-PRESS (ORB/GND) DISC (PD9)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) LO2 TANK PRE-PRESS (ORB/GND) DISC
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
A GO2 LEAK IS A FIRE/EXPLOSION HAZARD (LOSS OF VEHICLE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1071 ABORT: /NA

ITEM: LO2 GROUND FILL & DRAIN (ORB/GND) DISCONNECT
(PD12)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 GROUND FILL & DRAIN (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	/NA
LIFTOFF:	/NA		TAL:	/NA
ONORBIT:	/NA		AOA:	/NA
DEORBIT:	/NA		ATO:	/NA
LANDING/SAFING:	/NA			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0005-0012,0032

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LO2 IS LOADED INTO THE ET LO2 TANK THROUGH THIS DISCONNECT. THE LAUNCH WILL BE DELAYED IF THE LO2 IS NOT LOADED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; V070-415703

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1072 ABORT: /NA

ITEM: LO2 GROUND FILL & DRAIN (ORB/GND) DISCONNECT
(PD12)
FAILURE MODE: EXTERNAL LEAKAGE (ONTO THE ORBITER SKIN)

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 GROUND FILL & DRAIN (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0005-0012,0032

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE AT THE GROUND/ORBITER INTERFACE OF THIS DISCONNECT CAN SPRAY LO2 ONTO THE ORBITER TPS. THIS LEAKAGE WILL CAUSE THE LAUNCH TO BE DELAYED (POTENTIAL DAMAGE TO TPS, FIRE HAZARD).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; V070-415703

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1073	ABORT:	/NA

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 GROUND FILL & DRAIN (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0005-0012,0032

EFFECTS/RATIONALE:

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; V070-415703

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1081 ABORT: /NA

ITEM: LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT (PD13)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LO2 FLOWS OUT OF THIS DISCONNECT DURING THE PRELAUNCH SSME THERMAL CONDITIONING. SINCE THIS THERMAL CONDITIONING IS NECESSARY FOR SSME IGNITION, THIS FAILURE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1082 ABORT: /NA

ITEM: LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT (PD13)
FAILURE MODE: EXTERNAL LEAKAGE (ONTO THE ORBITER SKIN)

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0001

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE AT THE GROUND/ORBITER INTERFACE OF THIS DISCONNECT CAN SPRAY LO2 ONTO THE ORBITER TPS. THIS LEAKAGE WILL CAUSE THE LAUNCH TO BE DELAYED (POTENTIAL DAMAGE TO TPS, FIRE HAZARD).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1083 ABORT: /NA

ITEM: LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT (PD13)
FAILURE MODE: EXTERNAL LEAKAGE (INTO AFT FUSELAGE)

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0001

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

SEAL FAILURE OF THIS DISCONNECT WILL SPRAY LO2 INTO THE AFT FUSELAGE. THE LO2 IS A FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; V070-415305

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 1084 ABORT: 2/1R

ITEM: LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT (PD13)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE PREVENTS THE VENTING OVERBOARD OF THE LO2 FROM THE SSME BLEED CHECK VALVES. THE VENTING OF THIS LO2 MAY NOT LEAVE ENOUGH PROPELLANT TO REACH ORBIT. THE LOSS OF ALL REDUNDANCY DURING THE LIFTOFF MISSION PHASE WILL CAUSE THE LOSS OF THE MISSION. THE LOSS OF ALL REDUNDANCY DURING AN ABORT MAY CAUSE THE DESTRUCTION OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	1085	ABORT:	2/1R

ITEM: LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT (PD13)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) POGO SUPPRESSION
- 4) LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE PREVENTS THE VENTING OVERBOARD OF THE LO2 (USED IN THE POGO SUPPRESSION SYSTEM) FROM THE SSME BLEED CHECK VALVES. THIS LOSS OF THE LO2 WOULD PREVENT THE PROPER OPERATION OF THE POGO SUPPRESSION SYSTEM.

THE POGO SUPPRESSION SYSTEM PREVENTS THE BUILDUP OF LOW FREQUENCY OSCILLATIONS. THE LOSS OF ALL REDUNDANCY COULD LEAD TO THE DESTRUCTION OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1091 ABORT: /NA

ITEM: GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
(PD15)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME276-0032-0017

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

A GO2 LEAK IS A FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1092 ABORT: 1/1

ITEM: GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
(PD15)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME276-0032-0017

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE AT THIS TEST POINT COUPLING CAN CAUSE THE LOSS OF THE ET LO2 TANK ULLAGE PRESSURE. THIS TANK PRESSURE IS NECESSARY FOR THE EFFICIENT OPERATION OF THE SSMS (NOT ENOUGH PROPELLANT LEFT TO FINISH THE MISSION).

A GO2 LEAK IS A FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/23/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/2
MDAC ID:	1093	ABORT:	1/1

ITEM: GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING (PD15)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME276-0032-0017

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THIS PART CAN SUPPLY ENOUGH ENERGY TO START THE PART ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT. (FIRE HAZARD)
THE BURN THROUGH OF THIS PART WILL CAUSE THE LOSS OF THE ET LO2 TANK ULLAGE PRESSURE. THE PROPELLENT WILL RUN OUT (LESS EFFICIENT SSME OPERATIONS). (LOSS OF VEHICLE DURING AN ABORT)

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; PROBLEM REPORT NO AC8335-01

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1094 ABORT: 1/1

ITEM: GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
(PD15)
FAILURE MODE: SPONTANEOUS IGNITION IN/OF PART

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME276-0032-0017

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

A FIRE CAN BE STARTED BY SPONTANEOUS IGNITION OF A CONTAMINATE PARTICLE. THE IMPACT OF A CONTAMINATE PARTICLE ON THIS PART CAN SUPPLY ENOUGH ENERGY TO START THE PART ON FIRE. THIS IS A PURE O2 ATMOSPHERE EFFECT.
THE VEHICLE WILL BE LOST IF THE FIRE SPREADS TO A SSME CAUSING A LARGER FIRE/EXPLOSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C; PROBLEM REPORT NO AC8335-01

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1101 ABORT: /NA

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE PREVALVES ARE OPEN DURING THE LO2 LOADING TO THERMALLY CONDITION THE SSMS. SINCE THIS THERMAL CONDITIONING IS NECESSARY FOR SSME IGNITION, THE LAUNCH WILL BE DELAYED IF THE PREVALVES DO NOT OPEN.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/2
MDAC ID:	1102	ABORT:	1/1

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE PREVALVE MUST BE OPEN FOR SSME OPERATION. THE PREMATURE CLOSURE OF A PREVALVE WILL SHUTDOWN AND POSSIBLY DAMAGE THE SSME. IF THIS FAILURE OCCURS DURING THE LIFTOFF MISSION PHASE, THE MISSION WILL BE LOST. IF THIS FAILURE OCCURS DURING AN ABORT, THE VEHICLE MAY BE LOST.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1103 ABORT: 1/1

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

A LO2 LEAK IS A FIRE/EXPLOSION HAZARD.
THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1104 ABORT: 2/1R

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: FAILS TO RELIEVE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/2R	TAL:	2/1R
ONORBIT:	2/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS CASE IS FOR THE TIME AFTER MECO AND BEFORE THE MPS DUMP.
THE UNLIKE REDUNDANT PART IS THE BLEED CHECK VALVE. THE LOSS OF
ALL REDUNDANCY MAY CAUSE THE PROPELLANT FEED LINE (BETWEEN THE
PREVALVE AND THE SSME) TO RUPTURE.

THE RESULTING OVERPRESSURIZATION OF THE AFT FUSELAGE WILL CAUSE
THE LOSS OF THE MISSION IN THE ONORBIT MISSION PHASES AND THE
LOSS OF THE VEHICLE DURING THE DEORBIT PHASE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/1R
MDAC ID:	1105	ABORT:	3/1R

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE PREVALVE MUST BE OPEN TO DUMP THE LO2 TRAPPED IN THE LINES.
THE LOSS OF ALL REDUNDANCY ONORBIT WILL CAUSE THE LOSS OF THE
MISSION (OUTGASSING MAY INTERFERE WITH SOME PAYLOADS).
THE AFT CG LIMIT WILL BE VIOLATED IF THIS PROPELLENT IS NOT
DUMPED. THEREFORE, THE LOSS OF ALL REDUNDANCY WILL CAUSE THE
LOSS OF THE VEHICLE DURING THE DEORBIT PHASE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/27/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1106 ABORT: 3/3

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE PREVALVES ARE CLOSED AFTER THE DUMP TO PREVENT THE
CONTAMINATION OF THE MPS DURING AND AFTER REENTRY. FAILURE WILL
NOT HAVE A SIGNIFICANT EFFECT ON THE VEHICLE OR MISSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/27/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1107	ABORT:	1/1

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE RESULTS OF A PREMATURE PREVALVE CLOSURE MAY INCLUDE UPSTREAM FEEDLINE RUPTURE (CAUSED BY A EXCESSIVE SYSTEM PRESSURE SURGE), UNCONTAINED ENGINE DAMAGE, POSSIBLE MULTIPLE ENGINE DAMAGE AND/OR FIRE/EXPLOSION.

THE WORST CASE RESULT IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/27/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1108	ABORT:	1/1

ITEM: LO2 PREVALVE (PV1, 2, 3)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) LO2 PREVALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS FAILURE (CRITICAL DURING MECO) WILL CAUSE A LOSS OF PRESSURE AT THE LO2 PUMP INLET. THIS COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION.
THE WORST CASE RESULT IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1121 ABORT: /NA

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 FEEDLINE RELIEF SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0406-0001,0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE PREVENTS THE LOSS OF LO2 FROM THE FEEDLINE MANIFOLD.
THE FAILURE OF THIS VALVE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 1122 ABORT: 2/1R

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
FAILURE MODE: FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEEDLINE RELIEF SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0406-0001,0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE LOSS OF ALL REDUNDANCY DURING ASCENT WILL ALLOW THE VENTING OF LO2 THROUGH THE MANIFOLD RELIEF VALVE. POSSIBLY THERE WILL NOT BE ENOUGH PROPELLANT TO REACH ORBIT. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1123	ABORT:	1/1

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEEDLINE RELIEF SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0406-0001,0002

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

EXTERNAL LEAKAGE OF THIS VALVE WILL SPRAY LO2 INTO THE AFT FUSELAGE. THIS LO2 IS A POTENTIAL FIRE/EXPLOSION HAZARD DURING ASCENT. THE MISSION IS LOST IN THE ONORBIT MISSION PHASES (OUTGASSING GO2 COULD INTERFERE WITH SOME PAYLOADS). THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1124 ABORT: 1/1

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 FEEDLINE RELIEF SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0406-0001,0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE FAILURE OF THIS VALVE TO OPEN AFTER MECO WILL CAUSE THE RUPTURE OF THE LO2 FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED.

THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1131 ABORT: /NA

ITEM: LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0007,0010,0013

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LO2 FLOWS THROUGH THIS VALVE DURING PROPELLANT LOADING. THE SUDDEN CLOSING OF THIS VALVE DURING FAST FILL WOULD RESULT IN A PRESSURE SPIKE.

THE WORST CASE IS RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1132 ABORT: /NA

ITEM: LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0007,0010,0013

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS FAILURE COULD SPRAY LO2 INTO THE AFT FUSELAGE. THE O2 IS A
FIRE/EXPLOSION HAZARD.
THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	1133	ABORT:	/NA

ITEM: LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERIOR LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0007,0010,0013

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE PROVIDES A REDUNDANT CLOSURE OF THE LO2 PROPELLANT FEED MANIFOLD. SINCE IT IS NECESSARY FOR THIS VALVE TO BE CLOSED PRIOR TO LAUNCH, THIS FAILURE WILL CAUSE THE LAUNCH TO BE DELAYED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	1134	ABORT:	2/1R

ITEM: LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)
FAILURE MODE: FAILS TO REMAIN CLOSED, INTERIOR LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0007,0010,0013

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE LOSS OF ALL REDUNDANCY WILL ALLOW THE LOSS OF LO2 THROUGH THIS VALVE. THIS COULD LEAVE THE VEHICLE WITHOUT ENOUGH PROPELLENT TO REACH ORBIT.
THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT.
THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	1135	ABORT:	2/1R

ITEM: LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)
FAILURE MODE: EXTERIOR LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	2/1R	RTLS: 2/1R
LIFTOFF:	2/1R	TAL: 2/1R
ONORBIT:	3/3	AOA: 2/1R
DEORBIT:	3/3	ATO: 2/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0007,0010,0013

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

EXTERIOR LEAKAGE OF THIS VALVE WILL SPRAY LO2 INTO THE AFT FUSELAGE. THERE MAY NOT BE ENOUGH PROPELLANT TO REACH ORBIT. THE O2 IS A FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1136 ABORT: 3/3

ITEM: LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0007,0010,0013

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE OPENS FOR VACUUM INERTING TO DUMP ANY REMAINING LO2 TRAPPED IN THE MPS. THIS FAILURE WILL NOT CAUSE THE LOSS OF THE VEHICLE OR OF THE MISSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1137 ABORT: 3/3

ITEM: LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0007,0010,0013

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE CLOSURES AFTER VACUUM INERTING TO PREVENT THE
CONTAMINATION OF THE MPS DURING REENTRY/LANDING. THIS FAILURE
WILL NOT CAUSE THE LOSS OF THE VEHICLE OR OF THE MISSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1151	ABORT:	/NA

ITEM: LO2 INBOARD FILL AND DRAIN VALVE (PV10)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0008,0011,0014

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LO2 FLOWS THROUGH THIS VALVE DURING PROPELLANT LOADING. THE SUDDEN CLOSING OF THIS VALVE DURING FAST FILL WOULD RESULT IN A PRESSURE SPIKE.
THE WORST CASE IS RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1152 ABORT: /NA

ITEM: LO2 INBOARD FILL AND DRAIN VALVE (PV10)
FAILURE MODE: EXTERIOR LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0008,0011,0014

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS FAILURE COULD SPRAY LO2 INTO THE AFT FUSELAGE. THIS O2 IS A
FIRE/EXPLOSION HAZARD.
THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	1153	ABORT:	/NA

ITEM: LO2 INBOARD FILL AND DRAIN VALVE (PV10)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERIOR LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0008,0011,0014

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE PROVIDES A REDUNDANT CLOSURE OF THE LO2 PROPELLENT FEED MAINFOLD. SINCE IT IS NECESSARY FOR THIS VALVE TO BE CLOSED PRIOR TO LAUNCH, THIS FAILURE WILL CAUSE THE LAUNCH TO BE DELAYED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1154 ABORT: 3/3

ITEM: LO2 INBOARD FILL AND DRAIN VALVE (PV10)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0008,0011,0014

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE OPENS FOR VACUUM INERTING TO DUMP ANY REMAINING LO2 TRAPPED IN THE MPS. THIS FAILURE WILL NOT CAUSE THE LOSS OF THE MISSION AND/OR VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1155	ABORT:	1/1

ITEM: LO2 INBOARD FILL AND DRAIN VALVE (PV10)
FAILURE MODE: FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0008,0011,0014

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

OPENING OF THE INBOARD FILL AND DRAIN VALVE DURING BOOST WOULD ALLOW A GAS POCKET TO ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMEs.
THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN (LOSS OF VEHICLE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	1156	ABORT:	2/1R

ITEM: LO2 INBOARD FILL AND DRAIN VALVE (PV10)
FAILURE MODE: FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0008,0011,0014

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE LOSS OF ALL REDUNDANCY WILL ALLOW THE LOSS OF LO2 THROUGH THIS VALVE. THIS COULD LEAVE THE VEHICLE WITHOUT ENOUGH PROPELLANT TO REACH ORBIT.

THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT.
THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1157 ABORT: 1/1

ITEM: LO2 INBOARD FILL AND DRAIN VALVE (PV10)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 OUTBOARD FILL AND DRAIN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0008,0011,0014

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

EXTERIOR LEAKAGE OF THIS VALVE WILL SPRAY LO2 INTO THE AFT FUSELAGE. THERE MAY NOT BE ENOUGH PROPELLANT TO REACH ORBIT. THE O2 IS A FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	1171	ABORT:	/NA

ITEM: LO2 BLEED SHUTOFF VALVE (PV19)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 BLEED SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0035,0045,0055

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LO2 FLOWS THROUGH THIS VALVE AS PART OF THE PRELAUNCH SSME THERMAL CONDITIONING. SINCE THIS THERMAL CONDITIONING IS NECESSARY FOR SSME IGNITION, THIS FAILURE WILL CAUSE THE LAUNCH TO BE DELAYED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1172 ABORT: /NA

ITEM: LO2 BLEED SHUTOFF VALVE (PV19)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERIOR
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 BLEED SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0035,0045,0055

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

SINCE THIS VALVE PREVENTS THE VENTING OVERBOARD OF THE LO2 FROM THE SSME BLEED CHECK VALVES, IT MUST BE CLOSED PRIOR TO SSME IGNITION. IF THIS VALVE FAILS, THE LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1174 ABORT: 1/1

ITEM: LO2 BLEED SHUTOFF VALVE (PV19)
FAILURE MODE: EXTERIOR LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 BLEED SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0035,0045,0055

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

EXTERIOR LEAKAGE OF THIS VALVE WILL SPRAY LO2 INTO THE AFT FUSELAGE. THERE MAY NOT BE ENOUGH PROPELLANT TO REACH ORBIT. THE O2 IS A FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1175	ABORT:	1/1

ITEM: LO2 BLEED SHUTOFF VALVE (PV19)
FAILURE MODE: FAILS TO RELIEVE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 BLEED SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	/NA	RTLS:
LIFTOFF:	2/2	TAL:
ONORBIT:	2/2	AOA:
DEORBIT:	1/1	ATO:
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0035,0045,0055

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE INCORPORATES A RELIEF FUNCTION (AFTER MECO AND BEFORE THE MPS DUMP). FAILURE OF THIS PART COULD CAUSE THE RUPTURE OF THE LINE BETWEEN THE SHUTOFF AND DISCONNECT VALVES. THE BOILING OF THE LO2 COULD OVERPRESSURIZE THE AFT FUSELAGE CAUSING THE LOSS OF THE VEHICLE DURING REENTRY/LANDING.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1176 ABORT: 1/1

ITEM: LO2 BLEED SHUTOFF VALVE (PV19)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) POGO SUPPRESSION
- 4) LO2 BLEED SHUTOFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0035,0045,0055

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THIS VALVE WOULD STOP THE POGO SUPPRESSION SYSTEM.
FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL
OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE
WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-
0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1181 ABORT: /NA

ITEM: LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20,
21)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 POGO ACCUMULATOR RECIRCULATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0012,0022,0032,0052

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THESE VALVES ARE CLOSED AS PART OF THE PRELAUNCH SSME THERMAL
CONDITIONING. SINCE THIS THERMAL CONDITIONING IS NECESSARY FOR
SSME IGNITION, THIS FAILURE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-
0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1182 ABORT: /NA

ITEM: LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20,
21)
FAILURE MODE: FAILS TO OPEN, FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 POGO ACCUMULATOR RECIRCULATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	/NA
LIFTOFF:	/NA		TAL:	/NA
ONORBIT:	/NA		AOA:	/NA
DEORBIT:	/NA		ATO:	/NA
LANDING/SAFING:	/NA			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0012,0022,0032,0052

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THESE VALVES ARE OPENED JUST PRIOR TO SSME IGNITION. SINCE BOTH VALVES MUST BE OPEN FOR THE OPERATION OF THE POGO SUPPRESSION SYSTEM, THE FAILURE OF EITHER VALVE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1183	ABORT:	1/1

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

1) MPS
2) O2 SUBSYSTEM
3) LO2 PROP FEED
4) LO2 POGO ACCUMULATOR RECIRCULATION VALVE
5)
6)
7)
8)
9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0012,0022,0032,0052

EFFECTS/RATIONALE:

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1184 ABORT: 2/1R

ITEM: LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20,
21)
FAILURE MODE: FAILS TO RELIEVE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) SSME INTERFACE
- 4) LO2 POGO ACCUMULATOR RECIRCULATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	2/1R
LIFTOFF:	3/2R		TAL:	2/1R
ONORBIT:	3/3		AOA:	2/1R
DEORBIT:	2/1R		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0012,0022,0032,0052

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THESE VALVES INCORPORATE A RELIEF FUNCTION TO PREVENT THE RUPTURE OF THE LO2 FEEDLINE (FOR THE TIME AFTER MECO AND BEFORE THE MPS DUMP).

THE CONSEQUENCES INCLUDE FIRE/EXPLOSION HAZARD AND OVERPRESSURIZATION OF THE AFT FUSELAGE. THIS COULD RESULT IN THE LOSS OF THE VEHICLE DURING REENTRY/LANDING.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1185 ABORT: 2/1R

ITEM: LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20,
21)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) POGO SUPPRESSION
- 4) LO2 POGO ACCUMULATOR RECIRCULATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0012,0022,0032,0052

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

ONE OF THESE VALVES MUST BE OPEN FOR THE POGO SUPPRESSION SYSTEM OPERATION.
THE FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH CAN LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770; SEIFASSMEO SD75-SH-0200C

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/1R
MDAC ID:	1191	ABORT:	3/1R

ITEM: LO2 LOW LEVEL LIQUID SENSOR (MT1, 2)
FAILURE MODE: ERRONEOUS OUTPUT (FALSE WET)

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 LOW LEVEL LIQUID SENSOR
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC432-0205-0022

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:

FALSE WET SENSOR READINGS COULD ALLOW THE SSMEs BURN UNTIL ALL THE PROPELLANT IS USED. THE POSSIBLE RESULTS OF A SSME RUNNING DRY INCLUDE UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION. THE LOSS OF ALL REDUNDANCY COULD CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1192 ABORT: 2/1R

ITEM: LO2 LOW LEVEL LIQUID SENSOR (MT1, 2)
FAILURE MODE: ERRONEOUS OUTPUT (FALSE DRY)

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 LOW LEVEL LIQUID SENSOR
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC432-0205-0022

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:

FALSE DRY SENSOR READINGS COULD PREMATURELY SHUT DOWN THE SSMES.
THE LOSS OF ALL REDUNDANCY WILL CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1201 ABORT: /NA

ITEM: LO2 SYSTEM DELTA P TRANSDUCER (MT44, 50)
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 SYSTEM DELTA P TRANSDUCER
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC449-0164-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS COMPONENT PROVIDES AN INDIRECT MEASURE OF THE PROPELLENT LEVEL IN THE ET LO2 TANK. THE FAILURE OF THIS COMPONENT WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1202 ABORT: 1/1

ITEM: LO2 SYSTEM DELTA P TRANSDUCER (MT44, 50)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) LO2 SYSTEM DELTA P TRANSDUCER
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC449-0164-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

A LO2 LEAK IS A POTENTIAL FIRE/EXPLOSION HAZARD.
THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1211 ABORT: 2/1R

ITEM: LO2 PREPRESS DISCONNECT CHECK VALVE TEST PORT
(TP9)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 TANK PRESS
- 4) LO2 PREPRESS DISCONNECT CHECK VALVE TEST PORT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415446-001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE THROUGH THIS TEST PORT COULD CAUSE A LOSS OF ET LO2 TANK ULLAGE PRESSURE. BECAUSE OF THE LESS EFFICIENT SSME OPERATIONS, THERE WILL NOT BE ENOUGH PROPELLANT TO FINISH THE MISSION. THE VEHICLE MAY BE LOST DURING AN ABORT.
AN O2 LEAK IS A POTENTIAL FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/13/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1221	ABORT:	1/1

ITEM: LO2 17 INCH ORBITER DISCONNECT TEST PORT (TP17, 18)

FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN

SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROPELLANT FEED
- 4) LO2 17 INCH ORBITER DISCONNECT TEST PORT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	1/1	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE

PART NUMBER: MC284-0389-0501, 0521

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

A LO2 LEAK IS A POTENTIAL FIRE/EXPLOSION HAZARD.
THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1231 ABORT: 2/1R

ITEM: LO2 FEEDLINE RELIEF TEST PORT (TP24)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROPELLANT FEED
- 4) LO2 FEEDLINE RELIEF TEST PORT
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: V070-415468-001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

A LO2 LEAK IS A POTENTIAL FIRE/EXPLOSION HAZARD.
THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1241 ABORT: 1/1

ITEM: LO2 FEEDLINE MANIFOLD (MA1)
FAILURE MODE: BLOCKED FLOW

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEEDLINE MANIFOLD
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0074-0005

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMES (LIFTOFF). THE POSSIBLE EFFECTS OF BLOCKED FLOW INCLUDE PREMATURE SSME SHUT DOWN, UNCONTAINED SSME DAMAGE AND FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1242 ABORT: 1/1

ITEM: LO2 FEEDLINE MANIFOLD (MA1)
FAILURE MODE: RUPTURE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEEDLINE MANIFOLD
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0074-0005

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMES (LIFTOFF). THE SSMES WILL BE SHUT DOWN. LO2 FROM THIS RUPTURED LINE IS A FIRE/EXPLOSION HAZARD. BOILING OF THE LO2 CAN OVERPRESSURIZE AND THUS DESTROY THE AFT FUSELAGE. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/14/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1243	ABORT:	1/1

ITEM: LO2 FEEDLINE MANIFOLD (MA1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEEDLINE MANIFOLD
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0074-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMEs (LIFTOFF). THE LEAKING LO2 IS A POTENTIAL FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/14/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	1244	ABORT:	3/3

ITEM: LO2 FEEDLINE MANIFOLD (MA1)
FAILURE MODE: LOSS OF INSULATION

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEEDLINE MANIFOLD
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0074-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMES (LIFTOFF). THE FAILURE OF INSULATION ON THIS LINE WILL PREVENT THE PRELAUNCH PROPELLENT THERMAL CONDITIONING. THIS FAILURE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1251 ABORT: /NA

ITEM: LO2 FILL & DRAIN LINE (FH1)
FAILURE MODE: BLOCKED FLOW

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 FILL & DRAIN LINE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0076-0002,0012

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK. IT IS NOT IN USE DURING FLIGHT.
THE LO2 WILL NOT BE LOADED INTO THE ET LO2 TANK IF THIS LINE IS BLOCKED. THIS FAILURE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/14/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1252	ABORT:	/NA

ITEM: LO2 FILL & DRAIN LINE (FH1)
FAILURE MODE: RUPTURE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 FILL & DRAIN LINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0076-0002,0012

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK. IT IS NOT IN USE DURING FLIGHT.
LO2 FROM THIS RUPTURED LINE IS A POTENTIAL FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1253 ABORT: /NA

ITEM: LO2 FILL & DRAIN LINE (FH1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 FILL & DRAIN LINE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0076-0002,0012

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK. IT IS NOT IN USE DURING FLIGHT.
THE LEAKING LO2 IS A POTENTIAL FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1254 ABORT: /NA

ITEM: LO2 FILL & DRAIN LINE (FH1)
FAILURE MODE: LOSS OF INSULATION

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 FILL & DRAIN
- 4) LO2 FILL & DRAIN LINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0076-0002,0012

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK. IT IS NOT IN USE DURING FLIGHT.
THE FAILURE OF INSULATION ON THIS LINE WILL PREVENT THE PRELAUNCH THERMAL CONDITIONING OF THE PROPELLENT. THIS FAILURE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1261	ABORT:	1/1

ITEM: LO2 17 INCH FEEDLINE (FH2)
FAILURE MODE: BLOCKED FLOW

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 17 INCH FEEDLINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0074-0001,0201

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMEs (LIFTOFF). THE POSSIBLE EFFECTS OF BLOCKED FLOW INCLUDE PREMATURE SSME SHUTDOWN, UNCONTAINED SSME DAMAGE AND FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1262 ABORT: 1/1

ITEM: LO2 17 INCH FEEDLINE (FH2)
FAILURE MODE: RUPTURE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 17 INCH FEEDLINE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0074-0001,0201

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMEs (LIFTOFF). THE SSMEs WILL BE SHUT DOWN. LO2 FROM THIS RUPTURED LINE IS A FIRE/EXPLOSION HAZARD. BOILING OF THE LO2 CAN OVERPRESSURIZE AND THUS DESTROY THE AFT FUSELAGE. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1263 ABORT: 1/1

ITEM: LO2 17 INCH FEEDLINE (FH2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 17 INCH FEEDLINE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0074-0001,0201

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMS (LIFTOFF). THE LEAKING LO2 IS A POTENTIAL FIRE/EXPLOSION HAZARD. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1264 ABORT: 3/3

ITEM: LO2 17 INCH FEEDLINE (FH2)
FAILURE MODE: LOSS OF INSULATION

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 17 INCH FEEDLINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0074-0001,0201

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE GROUND TO THE ET LO2 TANK (PRELAUNCH) AND FROM THE ET LO2 TANK TO THE SSMES (LIFTOFF). THE FAILURE OF INSULATION ON THIS LINE WILL PREVENT THE PRELAUNCH PROPELLENT THERMAL CONDITIONING. THIS FAILURE WILL DELAY THE LAUNCH.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1271 ABORT: 1/1

ITEM: LO2 12 INCH FEEDLINE (FH3, 4, 5)
FAILURE MODE: BLOCKED FLOW

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 12 INCH FEEDLINE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0074-0202,0302

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE 17 INCH FEEDLINE TO A SSME. THE POSSIBLE EFFECTS OF BLOCKED FLOW IN THIS LINE INCLUDE PREMATURE SSME SHUTDOWN, UNCONTAINED SSME DAMAGE AND FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	1272	ABORT:	1/1

ITEM: LO2 12 INCH FEEDLINE (FH3, 4, 5)
FAILURE MODE: RUPTURE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 12 INCH FEEDLINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0074-0202,0302

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE 17 INCH FEEDLINE TO A SSME. A SSME WILL BE SHUTDOWN. LO2 FROM THIS RUPTURED LINE IS A FIRE/EXPLOSION HAZARD. BOILING OF THE LO2 CAN OVERPRESSURIZE AND THUS DESTROY THE AFT FUSELAGE. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1273 ABORT: 1/1

ITEM: LO2 12 INCH FEEDLINE (FH3, 4, 5)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 12 INCH FEEDLINE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC274-0074-0202,0302

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS LINE TRANSPORTS LO2 FROM THE 17 INCH FEEDLINE TO A SSME.
THE LEAKING LO2 IS A POTENTIAL FIRE/EXPLOSION HAZARD. THE WORST
CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM
BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102;
SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 1281 ABORT: 2/1R

ITEM: LO2 FEED MANIFOLD RELIEF VALVE (RV5)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEED MANIFOLD RELIEF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0501-0001

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

EXTERNAL LEAKAGE OF THIS VALVE WILL SPRAY LO2 INTO THE AFT FUSELAGE. THIS LO2 IS A POTENTIAL FIRE/EXPLOSION HAZARD DURING ASCENT.

THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/18/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	1282	ABORT:	2/1R

ITEM: LO2 FEED MANIFOLD RELIEF VALVE (RV5)
FAILURE MODE: FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) LO2 FEED MANIFOLD RELIEF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0501-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE LOSS OF ALL REDUNDANCY DURING ASCENT WILL ALLOW THE VENTING OF LO2 THROUGH THIS VALVE. POSSIBLY THERE WILL NOT BE ENOUGH PROPELLENT TO REACH ORBIT.
THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT.
THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 1283 ABORT: 1/1

ITEM: LO2 FEED MANIFOLD RELIEF VALVE (RV5)
FAILURE MODE: FAILS TO RELIEVE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) LO2 FEED MANIFOLD RELIEF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0501-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS VALVE RELIEVES PRESSURE IN THE LO2 FEEDLINE MANIFOLD AFTER MECO. THE LO2 FEEDLINE MANIFOLD WILL RUPTURE IF ALL REDUNDANCY IS LOST.

THE AFT FUSELAGE IS OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOAD). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE (LOSS OF VEHICLE).

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/19/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	1291	ABORT:	3/3

ITEM: GO2 PRESSURE MANIFOLD REPRESS ORIFICE (RP1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 DUMP & PURGE
- 4) GO2 PRESSURE MANIFOLD REPRESS ORIFICE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	/NA	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415552-001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS ORIFICE PASSES HELIUM FROM THE PNEUMATIC HELIUM SUPPLY SYSTEM INTO THE GO2 LINES TO REPRESSURIZE THESE LINES PRIOR TO REENTRY.

THE FAILURE OF THIS PART WILL ALLOW THE CONTAMINATION OF THE MPS BY THE ATMOSPHERE DURING REENTRY. THIS WILL NOT CAUSE THE LOSS OF THE VEHICLE OR OF THE MISSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 1292 ABORT: 3/3

ITEM: GO2 PRESSURE MANIFOLD REPRESS ORIFICE (RP1)
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: K.A. HOLDEN SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) O2 SUBSYSTEM
- 3) LO2 PROP FEED
- 4) GO2 PRESSURE MANIFOLD REPRESS ORIFICE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415552-001

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS ORIFICE (AND CHECK VALVE CV12) PREVENTS THE BLEEDING OF LO2 FROM THE 17 INCH LO2 FEEDLINE INTO THE GO2 (ET LO2 TANK ULLAGE PRESSURE) SYSTEM.
THE LOSS OF ALL REDUNDANCY WILL NOT CAUSE THE LOSS OF THE VEHICLE OR OF THE MISSION.

REFERENCES: VS70-41500X; SSSH DWG 10.11; OMRSD; BOOSTER SYSTEM BRIEFS JSC-19041; MAIN PROPULSION SYSTEM WORKBOOK MPS 2102; SHUTTLE FLIGHT OPERATIONS MANUAL JSC-12770

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	9/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2001	ABORT:	3/1R

ITEM: LH2 INBOARD FILL AND DRAIN VALVE (PV12)
FAILURE MODE: FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 INBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

INABILITY TO FILL LH2 TANK WILL CAUSE LAUNCH DELAY. FAILURE DURING TANK FILL MAY CAUSE RUPTURE OF FILL LINE, RELEASING LH2 AND CREATING A FIRE/EXPLOSION HAZARD. INABILITY TO DUMP RESIDUAL LH2 WOULD ALLOW HYDROGEN TO MIX WITH ATMOSPHERIC OXYGEN DURING ENTRY OR ON THE GROUND, FORMING AN EXPLOSIVE MIXTURE. VALVE IS NOT REQUIRED TO OPEN DURING RTLS. VACUUM INERTING PROCEDURE SERVES AS A REDUNDANCY.

REFERENCES: JSC-19041, BOOSTER SYSTEMS BRIEFS; VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2002 ABORT: 1/1

ITEM: LH2 INBOARD FILL AND DRAIN VALVE (PV12)
FAILURE MODE: FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 INBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

PREIGNITION FAILURE WILL CAUSE LAUNCH DELAY, OR, IF ALL
REDUNDANCY FAILS, THE VEHICLE CAN BE DESTROYED BY FIRE/EXPLOSION
OF ESCAPING LH2. FAILURE AFTER ENGINE START WILL ALLOW A GAS
POCKET TO ENTER THE FEEDLINE, RESULTING IN ENGINE PUMP CAVITATION
AND EXPLOSION OF THE ENGINE(S). IF THE O/B VALVE ALSO FAILS, LH2
WILL ESCAPE THE VEHICLE, RESULTING IN A LOW LEVEL SHUTDOWN BEFORE
GUIDANCE INITIATED MECO AND/OR CREATION OF AN EXPLOSIVE MIXTURE
OF H2 AND ATMOSPHERIC O2 OUTSIDE THE VEHICLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/1R
MDAC ID: 2003 ABORT: 3/1R

ITEM: LH2 INBOARD FILL AND DRAIN VALVE (PV12)
FAILURE MODE: FAIL TO OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 INBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: /NA
LIFTOFF:	3/3	TAL: 3/1R
ONORBIT:	3/3	AOA: 3/1R
DEORBIT:	3/1R	ATO: 3/1R
LANDING/SAFING:	3/1R	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: CONTAMINATION, BINDING, PEICE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

INABILITY TO FILL TANK WILL CAUSE LAUNCH DELAY. NO REDUNDANCY FOR PRELAUNCH PHASE. LOSS OF ALL REDUNDANCY WOULD MAKE DUMPING LH2 RESIDUALS IMPOSSIBLE. VENTING H2 GAS COULD CREATE AN EXPLOSIVE MIXTURE WITH ATMOSPHERIC O2 DURING DEORBIT AND LANDING. THE VALVE IS NOT REQUIRED TO OPEN DURING RTLS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/26/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/1R
MDAC ID: 2004 ABORT: 3/1R

ITEM: LH2 INBOARD FILL AND DRAIN VALVE (PV12)
FAILURE MODE: FAIL TO CLOSE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 INBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: CONTAMINATION, BINDING, PEICE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAIL TO CLOSE PRELAUNCH WOULD CAUSE LAUNCH DELAY. FAILURE TO CLOSE 6 SEC AFTER MPS DUMP START WOULD ALLOW H2 TO FREEZE IN THE FILL AND DRAIN LINE, PREVENTING A NORMAL DUMP. NO REDUNDANCY TO PREVENT FREEZE-UP, BUT ALTERNATE PATHS EXIST TO DUMP REMAINING LIQUID H2. LOSS OF REDUNDANCY WOULD TRAP H2, WHICH COULD ESCAPE DURING ENTRY AND LANDING TO CREATE AN EXPLOSIVE MIXTURE WITH ATMOSPHERIC OXYGEN.

REFERENCES: JSC-19041; BOOSTER SYSTEMS BRIEFS, VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	9/26/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2005	ABORT:	1/1

ITEM: LH2 INBOARD FILL AND DRAIN VALVE (PV12)
FAILURE MODE: FAIL TO RELIEVE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 INBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	1/1	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	/NA	AOA: 1/1
DEORBIT:	/NA	ATO: 1/1
LANDING/SAFING:	/NA	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: CONTAMINATION, BINDING

EFFECTS/RATIONALE:

FAILURE TO RELIEVE WILL ALLOW PRESSURE BUILDUP FROM BOILOFF OF RESIDUAL LH2. EFFECT OF THIS FAILURE IS POSSIBLE RUPTURE OF LH2 FILL LINE. MPS DUMP WILL RELIEVE ANY PRESSURE BUILDUP. FAILURE MODE IS NA AFTER MPS INERTING SINCE THE VALVE IS THEN LEFT OPEN FOR THE REMAINDER OF THE FLIGHT. NO REDUNDANCY FOR THIS MODE.

REFERENCES: JSC-19041; BOOSTER SYSTEMS BRIEFS; MC271-0076

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/26/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2006 ABORT: 3/3

ITEM: LH2 INBOARD FILL AND DRAIN VALVE (PV12)
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 INBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURE
FAILURE

EFFECTS/RATIONALE:

LAUNCH MAY BE DELAYED IF INDICATOR FAILS PRELAUNCH. FAILURE
AFTER LIFTOFF IS CRIT 3. LH2 MANIFOLD PRESSURE TRANSDUCER COULD
BE CONSIDERED REDUNDANT FOR SOME PORTIONS OF FLIGHT SUCH AS MPS
VACUUM INERTING. LEVEL SENSORS ARE A REDUNDANCY FOR
PRELAUNCH.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:		HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2007	ABORT:	1/1

ITEM: LH2 INBOARD FILL AND DRAIN VALVE (PV12)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 INBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PROCEDURAL ERROR, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD ON THE PAD AND WHILE STILL IN THE ATMOSPHERE DURING POWERED FLIGHT. NO HAZARD AFTER MPS DUMP AND PURGE.

REFERENCES: V070-415702

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2011 ABORT: 1/1

ITEM: LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)
FAILURE MODE: FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 OUTBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	/NA
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

INABILITY TO FILL TANK WILL CAUSE LAUNCH DELAY. FAILURE DURING
TANK FILL MAY CAUSE RUPTURE OF FILL LINE, RELEASING LH2 AND
CREATING A FIRE/EXPLOSION HAZARD. INABILITY TO DUMP RESIDUAL LH2
WOULD ALLOW VENTING GH2 TO COMBINE WITH ATMOSPHERIC OXYGEN AND
CREATE AN EXPLOSIVE MIXTURE DURING ENTRY AND LANDING.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2012 ABORT: 2/1R

ITEM: LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)
FAILURE MODE: FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 OUTBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. LOSS OF REDUNDANCY DURING PRELAUNCH WILL ALLOW LH2 TO FLOW OUT THE FILL LINE, CREATING A FIRE/EXPLOSION HAZARD. SECOND FAILURE DURING POWERED FLIGHT (LOSS OF ALL REDUNDANCY) WILL ALLOW LH2 TO ESCAPE, CAUSING ENGINE SHUTDOWN PRIOR TO GUIDANCE INITIATED MECO. INBOARD VALVE HAS POSITION INDICATOR SO LOSS OF REDUNDANCY IS READILY DETECTABLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2013 ABORT: 1/1

ITEM: LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)
FAILURE MODE: FAIL TO OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 OUTBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	
		ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: CONTAMINATION, BINDING, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

INABILITY TO FILL TANK WILL CAUSE LAUNCH DELAY. INABILITY TO DUMP RESIDUAL LH2 WOULD ALLOW GH2 VENTING DURING ENTRY AND LANDING TO CREATE AN EXPLOSIVE MIXTURE WITH ATMOSPHERIC O2. THE VALVE IS NOT REQUIRED TO OPEN DURING AN RTLS.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2014 ABORT: 2/1R

ITEM: LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)
FAILURE MODE: FAIL TO CLOSE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 OUTBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: CONTAMINATION, BINDING, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. LOSS OF REDUNDANCY OR SECOND FAILURE DURING TAL WILL ALLOW H2 TO CONTINUE ESCAPING THE VEHICLE, COMBINE WITH ATMOSPHERIC OXYGEN AND CREATE A FIRE/EXPLOSION HAZARD. NORMAL TAL DUMP IS ONLY A PARTIAL ONE. LOSS OF REDUNDANCY IS READILY DETECTABLE VIA VALVE POSITION INDICATORS. THE VALVE DOES NOT OPEN DURING RTLS.

REFERENCES: JSC-19041

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/06/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	2015	ABORT:	3/3

ITEM: LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 OUTBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. THIS FUNCTION CAN BE CONSIDERED TO HAVE REDUNDANCY FOR SOME FLIGHT PHASES OR EVENTS. IF THE LEVEL SENSORS INDICATE THE LH2 TANK IS FILLING, THE VALVE IS SURELY OPEN. IF LH2 MANIFOLD PRESSURE DROPS DURING SCHEDULED TIME FOR LH2 DUMP, THE VALVE MUST BE OPEN. NO REDUNDANCY FOR MAIN ENGINE ASCENT PHASE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2016 ABORT: 1/1

ITEM: LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 OUTBOARD FILL AND DRAIN VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0397-0015

CAUSES: MECHANICAL SHOCK, VIBRATION, PROCEDURAL ERROR, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 CAN LEAD TO A FIRE OR EXPLOSION DURING POWERED FLIGHT OR WHILE STILL ON THE PAD. NO HAZARD AFTER MPS DUMP AND PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2021 ABORT: 1/1

ITEM: LH2 FILL AND DRAIN LINE (FH6)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 FILL AND DRAIN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0076-0021

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

NO REDUNDANCY TO PREVENT OR LIMIT DAMAGE TO OTHER SYSTEM COMPONENTS FROM CATASTROPHIC FAILURE. DAMAGE TO OTHER SYSTEMS CAN DESTROY THE VEHICLE. THE FAILURE COULD ONLY OCCUR AS A RESULT OF A PREVIOUS FAILURE OF THE RELIEF VALVE BUILT INTO THE I/B FILL AND DRAIN VALVE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/23/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	2022	ABORT:	3/3

ITEM: LH2 FILL AND DRAIN LINE (FH6)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 FILL AND DRAIN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0076-0021

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL PREVENT TANK FILL AT SCHEDULED RATES.
LAUNCH DELAY TO CLEAR LINE WILL BE NECESSARY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2023 ABORT: 3/3

ITEM: LH2 FILL AND DRAIN LINE (FH6)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 FILL AND DRAIN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0076-0021

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
FAILURE WILL ALLOW LH2 TEMPERATURE TO INCREASE DURING LOADING.
IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL BE PREVENTED
AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2041 ABORT: 1/1

ITEM: LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORB HALF)
(PD17)
FAILURE MODE: EXTERNAL LEAK

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0003

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF LH2 IS A FIRE/EXPLOSION HAZARD. LEAKING RESIDUAL
HYDROGEN DURING POWERED ASCENT CAN COMBINE WITH ATMOSPHERIC
OXYGEN AND CREATE AN EXPLOSIVE MIXTURE. LEAKING LH2 DURING
PRELAUNCH CAN DAMAGE TPS TILES AND CAUSE LOSS OF VEHICLE DURING
ENTRY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2042 ABORT: 2/1R

ITEM: LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORB HALF)
(PD17)
FAILURE MODE: FAIL TO CLOSE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/2R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

VALVE IS EXPECTED TO CLOSE PRELAUNCH AND REMAIN CLOSED. FAILURE SHOULD CAUSE LAUNCH DELAY. LOSS OF REDUNDANCY WILL ALLOW LH2 TO ESCAPE THE VEHICLE DURING ASCENT RESULTING IN LOSS OF VEHICLE. IF NOMINAL ORBIT IS ACHIEVED, REMAINING H2 WILL BE VENTED AND BE OF NO FURTHER CONSEQUENCE.

REFERENCES: VS70-41500X, VO70-415610

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:		HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	2043	ABORT:	2/1R

ITEM: LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORB HALF)
(PD17)
FAILURE MODE: FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0003

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE SHOULD CAUSE LAUNCH DELAY. SECOND FAILURE, OR LOSS OF ALL REDUNDANCY WILL ALLOW ESCAPE OF LH2 FROM THE MAIN FEEDLINE DURING ASCENT. ENGINES COULD CUTOFF EARLY OR EXPLODE BECAUSE OF LOW PUMP INLET PRESSURE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2044 ABORT: /NA

ITEM: LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORB HALF)
(PD17)
FAILURE MODE: FAIL TO OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0004-0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FAILURE TO OPEN PRELAUNCH WILL PRECLUDE LIFTOFF. NOT REQUIRED TO
OPEN IN ANY OTHER PHASE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/1R
MDAC ID: 2051 ABORT: 3/1R

ITEM: LH2 REPLENISH VALVE (PV13)
FAILURE MODE: FAIL TO OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 REPLENISH VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE PRELAUNCH WILL CAUSE LAUNCH DELAY. LOSS OF ALL REDUNDANCY WILL PRECLUDE LH2 DUMP. HYDROGEN COULD THEN ESCAPE THE VEHICLE THROUGH THE RELIEF VALVE DURING ENTRY AND LANDING, CREATING AN EXPLOSIVE MIXTURE WITH ATMOSPHERIC OXYGEN. THE VALVE IS NOT REQUIRED TO OPEN DURING RTLS.

REFERENCES: VS70-41500X

DATE:	10/15/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	2052	ABORT:	3/3

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 REPLENISH VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

EFFECTS/RATIONALE:

FAILURE PRELAUNCH WILL CAUSE LAUNCH DELAY. FAILURE TO CLOSE AFTER MPS DUMP AND PURGE IS OF NO CONSEQUENCE. NO REDUNDANCY FOR THIS FAILURE MODE. THE VALVE IS NOT REQUIRED TO CLOSE DURING AN RTLS.

REPORT DATE 01/16/87

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/1R
MDAC ID: 2053 ABORT: 3/1R

ITEM: LH2 REPLENISH VALVE (PV13)
FAILURE MODE: FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 REPLENISH VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	HDW/FUNC
PRELAUNCH:	3/3	ABORT	
LIFTOFF:	3/3	RTLS:	/NA
ONORBIT:	3/3	TAL:	3/1R
DEORBIT:	3/1R	AOA:	3/1R
LANDING/SAFING:	3/1R	ATO:	3/1R

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. LOSS OF ALL REDUNDANCY WIL PREVENT LH2 DUMP. RESIDUAL H2 WILL ESCAPE THROUGH THE RELIEF VALVE THROUGHOUT THE REMAINDER OF THE FLIGHT. THIS IS A HAZARD DURING ENTRY AND LANDING, WHEN THE H2 CAN COMBINE WITH ATMOSPHERIC OXYGEN.

REFERENCES: JSC-19041, BOOSTER SYSTEMS BRIEFS; VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2054 ABORT: 2/1R

ITEM: LH2 REPLENISH VALVE (PV13)
FAILURE MODE: FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 REPLENISH VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 2/1R
LIFTOFF:	2/1R	TAL: 2/1R
ONORBIT:	3/3	AOA: 2/1R
DEORBIT:	3/3	ATO: 2/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. LOSS OF ALL REDUNDANCY, OR SECOND FAILURE, WILL ALLOW LH2 TO DUMP OVERBOARD DURING POWERED FLIGHT, RESULTING IN LOSS OF VEHICLE.

REFERENCES: SSSH; VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2055 ABORT: 1/1

ITEM: LH2 REPLENISH VALVE (PV13)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 REPLENISH VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
PRELAUNCH FAILURE IS A FIRE/EXPLOSION HAZARD. LEAKAGE OF
RESIDUAL H2 DURING POWERED FLIGHT CAN CREATE AN EXPLOSIVE MIXTURE
WITH ATMOSPHERIC OXYGEN. NO REDUNDANCY FOR THIS MODE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2061 ABORT: 3/3

ITEM: LH2 HI POINT BLEED VALVE (PV22)
FAILURE MODE: FAIL TO REMAIN OPEN, FAIL TO OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0023,-0033,-0043,-0053

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. IF LAUNCH OCCURS,
THIS FAILURE WILL HAVE NO HARMFUL EFFECTS. NO REDUNDANCY FOR
THIS FAILURE MODE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2062 ABORT: 2/1R

ITEM: LH2 HI POINT BLEED VALVE (PV22)
FAILURE MODE: FAIL TO REMAIN CLOSED, FAIL TO CLOSE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0023,-0033,-0043,-0053

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. SECOND FAILURE, OR LOSS OF ALL REDUNDANCY, WOULD ALLOW LH2 TO ESCAPE THROUGH THE BLEED DISCONNECT AND CAUSE LOSS OF VEHICLE, ON THE PAD OR DURING POWERED ASCENT, BY FIRE OR EXPLOSION.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/16/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2063	ABORT:	1/1

ITEM: LH2 HI POINT BLEED VALVE (PV22)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0023,-0033,-0043,-0053

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 CAN CREATE AN EXPLOSIVE MIXTURE WITH ATMOSPHERIC O2 BEFORE LAUNCH OR DURING POWERED ASCENT. POSSIBLE DESTRUCTION OF THE VEHICLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2071 ABORT: 1/1

ITEM: LH2 SYSTEM DELTA-P TRANSDUCER (MT44, MT50)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 SYSTEM DELTA-P TRANSDUCER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC449-0164-0002

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKING HYDROGEN IS A(N) FIRE/EXPLOSION HAZARD. POSSIBLE
DESTRUCTION OF THE VEHICLE.

REFERENCES: VS70-415007

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	2072	ABORT:	3/3

ITEM: LH2 SYSTEM DELTA-P TRANSDUCER (MT44, MT50)
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 SYSTEM DELTA-P TRANSDUCER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC449-0164-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THE TRANSDUCER IS ONLY USED DURING PRELAUNCH. FAILURE CAN CAUSE LAUNCH DELAY. LOSS OF ALL REDUNDANCY WILL CAUSE LAUNCH DELAY. IF LAUNCH OCCURS, FAILURE WILL HAVE NO EFFECT ON OTHER PHASES.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2081 ABORT: 1/1

ITEM: LH2 HI POINT BLEED LINE (FH19)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0010

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

RUPTURE OF THE LINE CAN CAUSE DAMAGE TO OTHER COMPONENTS LEADING TO THE POSSIBLE DESTRUCTION OF THE VEHICLE. ESCAPING HYDROGEN IS ALSO A HAZARD.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2082 ABORT: 3/3

ITEM: LH2 HI POINT BLEED LINE (FH19)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SUBSYSTEM
- 3) LH2 HI POINT BLEED LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0010

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FAILURE WILL CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2083 ABORT: 1/1

ITEM: LH2 HI POINT BLEED LINE (FH19)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 FILL AND DRAIN SYSTEM
- 3) LH2 HI POINT BLEED LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0010

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD SPEED UP BOILOFF OF RESIDUAL LH2 IN THE LINE. THE
INCREASING PRESSURE MAY CAUSE THE LINE TO BURST, RESULTING IN
LOSS OF VEHICLE. NO HAZARD AFTER MPS DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2091 ABORT: /NA

ITEM: LH2 RECIRCULATION DISCONNECT VALVE (PD3)
FAILURE MODE: FAIL TO OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION (ORB/ET) DISCONNET VALVE (ORB HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0390-0005,-0006,-0016,-0026

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WOULD NOT ALLOW RECIRCULATION TO BEGIN AND WOULD FORCE A LAUNCH DELAY. THE VALVE IS NOT COMMANDED TO OPEN IN ANY OTHER PHASE. NO REDUNDANCY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2092 ABORT: 3/3

ITEM: LH2 RECIRCULATION DISCONNECT VALVE (PD3)
FAILURE MODE: FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION (ORB/ET) DISCONNET VALVE (ORB HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0390-0005,-0006,-0016,-0026

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE BEFORE LAUNCH WILL CAUSE LAUNCH DELAY. IF LH2
RECIRCULATION AND TOPPING ARE ACCOMPLISHED BEFORE THE FAILURE, IT
WILL HAVE NO IMPACT ON THE MISSION.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2093	ABORT:	1/1

ITEM: LH2 RECIRCULATION DISCONNECT VALVE (PD3)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION (ORB/ET) DISCONNET VALVE (ORB HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0390-0005,-0006,-0016,-0026

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

IF THE VALVE IS NOT CLOSED AT ET SEP, THE THRUST OF ESCAPING LH2 CAN CAUSE RECONTACT WITH THE ET AND LOSS OF THE ORBITER. IF RECONTACT DAMAGE IS LIMITED TO TPS TILES, THE ORBITER CAN BE DESTROYED DURING ENTRY. AERO FORCES WILL PREVENT RECONTACT AFTER A RTLS ET SEP.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2094 ABORT: 1/1

ITEM: LH2 RECIRCULATION DISCONNECT VALVE (PD3)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION (ORB/ET) DISCONNECT VALVE (ORB HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0390-0005,-0006,-0016,-0026

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD, ON THE PAD OR IN
POWERED ASCENT. LEAKING LH2 CAN DAMAGE TPS TILES AND CAUSE LOSS
OF VEHICLE DURING ENTRY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/20/86
SUBSYSTEM: MPS
MDAC ID: 2101

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP VALVE (PV14, PV15, PV16)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE

PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. IF LAUNCH OCCURS,
THIS FAILURE WILL HAVE NO EFFECT ON THE MISSION.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2102 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP VALVE (PV14, PV15, PV16)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
PRELAUNCH FAILURE CAN CAUSE LAUNCH DELAY. IF LAUNCH OCCURS, THIS
FAILURE WILL HAVE NO HARMFUL EFFECT.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/20/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2103	ABORT:	1/1

ITEM: LH2 RECIRCULATION PUMP VALVE (PV14, PV15, PV16)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0021,-0031,-0041,-0051

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD PRELAUNCH AND DURING POWERED ASCENT WHEN THE VEHICLE IS STILL IN THE ATMOSPHERE. NO HAZARD AFTER MPS DUMP AND PURGE.

REFERENCES: VA70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2111 ABORT: 1/1

ITEM: LH2 PRESTART CONDITIONING MANIFOLD (MA3)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING MANIFOLD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0017

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

BURST OF A LINE CAN POTENTIALLY DAMAGE OTHER COMPONENTS AND LEAD TO DESTRUCTION OF THE VEHICLE OR LOSS OF LIFE. ESCAPING HYDROGEN IS ALSO A HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/20/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2112	ABORT:	1/1

ITEM: LH2 PRESTART CONDITIONING MANIFOLD (MA3)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING MANIFOLD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0017

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD ON THE PAD AND WHILE STILL IN THE ATMOSPHERE DURING POWERED FLIGHT. NO HAZARD AFTER MPS DUMP AND PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2113 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING MANIFOLD (MA3)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING MANIFOLD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0017

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FAILURE MAY CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2114 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING MANIFOLD (MA3)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING MANIFOLD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0017

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING PRESTART
CONDITIONING. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL
BE PREVENTED, AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2121 ABORT: 1/1

ITEM: LH2 PRESTART CONDITIONING PUMP LINE (FH11, FH13,
FH15)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING PUMP LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0011,-0012,-0013

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

BURST OF THE LINE CAN DAMAGE OTHER COMPONENTS AND LEAD TO LOSS OF
LIFE OR VEHICLE. ESCAPING HYDROGEN IS ALSO A HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2122 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING PUMP LINE (FH11, FH13, FH15)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING PUMP LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0011,-0012,-0013

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FAILURE MAY CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2123 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING PUMP LINE (FH11, FH13, FH15)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING PUMP LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0011,-0012,-0013

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING PRESTART CONDITIONING. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL BE PREVENTED, AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2131 ABORT: 1/1

ITEM: LH2 PRESTART CONDITIONING RETURN LINE (FH12, FH14, FH16)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING RETURN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0015,-0016,-0024

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

RUPTURE OF THE LINE CAN DAMAGE OTHER COMPONENTS AND LEAD TO LOSS OF LIFE OR VEHICLE IN ANY FLIGHT PHASE. ESCAPING H2 WOULD BE A FIRE/EXPLOSION HAZARD DURING PRELAUNCH OR MPS ASCENT.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2132 ABORT: 1/1

ITEM: LH2 PRESTART CONDITIONING RETURN LINE (FH12, FH14,
FH16)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING RETURN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0015,-0016,-0024

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD ON THE PAD OR DURING
POWERED FLIGHT. NO HAZARD AFTER MPS DUMP AND PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2133 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING RETURN LINE (FH12, FH14, FH16)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING RETURN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0015,-0016,-0024

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FAILURE MAY CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2134 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING RETURN LINE (FH12, FH14, FH16)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING RETURN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0015,-0016,-0024

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING PRESTART CONDITIONING. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL BE PREVENTED, AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2141 ABORT: 1/1

ITEM: LH2 PRESTART CONDITIONING REPLENISH LINE (FH17)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING REPLENISH LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0019

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

RUPTURE OF THE LINE CAN DAMAGE OTHER PARTS AND CAUSE LOSS OF LIFE OR VEHICLE. ESCAPING HYDROGEN IS ALSO A HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2142 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING REPLENISH LINE (FH17)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING REPLENISH LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0019

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FAILURE MAY CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2143 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING REPLENISH LINE (FH17)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING REPLENISH LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0019

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING
REPLENISHMENT. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL
BE PREVENTED, AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2151 ABORT: 1/1

ITEM: LH2 PRESTART CONDITIONING RETURN LINE (FH18)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING RETURN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0018

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

RUPTURE OF THE LINE CAN CAUSE DAMAGE TO OTHER PARTS THAT COULD LEAD TO LOSS OF LIFE OR VEHICLE. ESCAPING HYDROGEN IS ALSO A HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2152 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING RETURN LINE (FH18)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING RETURN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0018

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FAILURE MAY CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2153 ABORT: 3/3

ITEM: LH2 PRESTART CONDITIONING RETURN LINE (FH18)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 PRESTART CONDITIONING RETURN LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0075-0018

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING PRESTART
CONDITIONING. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL
BE PREVENTED, AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2161 ABORT: 1/1

ITEM: LH2 RECIRCULATION MANIFOLD RELIEF VALVE (RV7)
FAILURE MODE: FAIL TO OPEN (RELIEVE)

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION MANIFOLD RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0474-0002, -0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW RUPTURE OF LH2 PRESTART CONDITIONING RETURN LINES, REPLENISH LINE OR MANIFOLD DURING THE PERIOD FROM MECO + 2 SEC (CLOSING OF LH2 RECIRCULATION DISCONNECT VALVE) TO OMS-1 IGNITION + 6 SEC (OPENING OF TOPPING VALVE) WHEN THESE LINES ARE ISOLATED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2162 ABORT: 3/3

ITEM: LH2 RECIRCULATION MANIFOLD RELIEF VALVE (RV7)
FAILURE MODE: FAIL TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION MANIFOLD RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0474-0002, -0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NO HAZARDOUS EFFECTS.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2163 ABORT: 1/1

ITEM: LH2 RECIRCULATION MANIFOLD RELIEF VALVE (RV7)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION MANIFOLD RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0474-0002, -0003

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD WHEN THE VEHICLE IS IN THE ATMOSPHERE. NO HAZARD AFTER MPS DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2164 ABORT: 3/3

ITEM: LH2 RECIRCULATION MANIFOLD RELIEF VALVE (RV7)
FAILURE MODE: FAIL TO CLOSE (RESEAT)

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION MANIFOLD RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0474-0002, -0003

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NO HAZARDOUS EFFECTS.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2171 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
FAILURE MODE: INADVERTENT OPERATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC281-0030-0001

CAUSES: INADVERTENT ACTIVATION, PROCEDURAL ERROR, IMPROPER INPUT

EFFECTS/RATIONALE:

PRELAUNCH FAILURE MAY CAUSE LAUNCH DELAY. FAILURE IN OTHER
FLIGHT PHASES IS NOT HAZARDOUS.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2172 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
FAILURE MODE: INTERMITTENT OPERATION, ERRATIC OPERATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC281-0030-0001

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE DURING PRELAUNCH RECIRCULATION COULD CAUSE LAUNCH DELAY.
NO EFFECT ON OTHER PHASES.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2173 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
FAILURE MODE: FAIL TO START

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC281-0030-0001

CAUSES: MECHANICAL SHOCK, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PUMP IS USED ONLY DURING PRELAUNCH. FAILURE WILL CAUSE LAUNCH DELAY. IF ONE PUMP FAILS, THE REMAINING PUMPS COULD PROVIDE ADEQUATE CONDITIONING IF THE PREVALVE CORRESPONDING TO THE FAILED PUMP IS OPENED. LOSS OF ALL REDUNDANCY IS POSSIBLE BECAUSE ALL THREE PUMPS ARE CONTAINED IN A SINGLE PACKAGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2174 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
FAILURE MODE: FAIL TO STOP

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC281-0030-0001

CAUSES: PROCEDURAL ERROR, IMPROPER INPUT, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
FAILURE WILL CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/21/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2175 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC281-0030-0001

CAUSES: PROCEDURAL ERROR, INADVERTENT ACTIVATION

EFFECTS/RATIONALE:
FAILURE COULD CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2176 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
FAILURE MODE: DELAYED OPERATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC281-0030-0001

CAUSES: PROCEDURAL ERROR, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FAILURE COULD CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2177 ABORT: 1/1

ITEM: LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION PUMP (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC281-0030-0001

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS
DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2181 ABORT: 3/3

ITEM: LH2 PRE-PRESS CHECK VALVE (CV17)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) LH2 TANK PRE-PRESS CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

INABILITY TO PRE-PRESSURIZE THE LH2 TANK WILL CAUSE LAUNCH DELAY.
THE VALVE IS NOT NORMALLY OPEN IN ANY OTHER PHASE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2182 ABORT: 2/1R

ITEM: LH2 PRE-PRESS CHECK VALVE (CV17)
FAILURE MODE: FAIL TO CLOSE (RESEAT), FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) LH2 TANK PRE-PRESS CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

SECOND FAILURE WILL ALLOW ULLAGE PRESSURE TO BE LOST, RESULTING
IN LAUNCH DELAY DURING PRELAUNCH OR LOSS OF VEHICLE DURING
POWERED FLIGHT.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2183 ABORT: 1/1

ITEM: LH2 PRE-PRESS CHECK VALVE (CV17)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) LH2 TANK PRE-PRESS CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS
DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/23/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	2191	ABORT:	1/1R

ITEM: GH2 PRESSURIZATION ISOLATION CHECK VALVE
(CV21,CV22,CV23)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION ISOLATION CHECK VALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 1/1R
LIFTOFF:	2/1R	TAL: 1/1R
ONORBIT:	3/3	AOA: 1/1R
DEORBIT:	3/3	ATO: 1/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0002, -0012

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
PRELAUNCH FAILURE MAY CAUSE LAUNCH DELAY. SECOND FAILURE, OR LOSS OF ALL REDUNDANCY WILL CAUSE LOW ULLAGE PRESSURE AND MULTIPLE ENGINE SHUTDOWN DURING ASCENT. FAILURE DURING ABORT WILL CAUSE SHUTDOWN OF REMAINING ENGINES AND LOSS OF VEHICLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/24/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2192 ABORT: 1/1

ITEM: GH2 PRESSURIZATION ISOLATION CHECK VALVE
(CV21,CV22,CV23 AND TEST PORTS TP5,TP6,TP7)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION ISOLATION CHECK VALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0479-0002, -0012

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD, DURING PRELAUNCH OR
POWERED FLIGHT. NO HAZARD AFTER MPS DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/27/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2201 ABORT: 1/1R

ITEM: GH2 PRESSURIZATION FLOW CONTROL VALVE
(LV56, LV57, LV58)

FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION FLOW CONTROL VALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1R
LIFTOFF:	2/1R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0015, -0361

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

SECOND ASSOCIATED FAILURE WILL CAUSE LOSS OF VEHICLE BECAUSE OF LOW ULLAGE PRESSURE. LOSS OF ALL REDUNDANCY WILL CAUSE LAUNCH DELAY OR LOSS OF VEHICLE DURING POWERED ASCENT. LOW ULLAGE PRESSURE DURING ABORTS CAN CAUSE SHUTDOWN OF REMAINING ENGINES AND LOSS OF VEHICLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/27/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2202 ABORT: 1/1R

ITEM: GH2 PRESSURIZATION FLOW CONTROL VALVE
(LV56, LV57, LV58)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION FLOW CONTROL VALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1R
LIFTOFF:	2/1R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0015, -0361

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

SECOND ASSOCIATED FAILURE WILL ALLOW OVERPRESSURIZATION OF TANK AND RELIEVING OF GH2 AT LOW ALTITUDE, CREATING A FIRE/EXPLOSION HAZARD. LH2 TANK TPS FIRE CAN CAUSE ET STRUCTURAL FAILURE. LOSS OF ALL REDUNDANCY WILL CAUSE OVERPRESSURIZATION OF TANK.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/27/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2203 ABORT: 1/1

ITEM: GH2 PRESSURIZATION FLOW CONTROL VALVE
(LV56, LV57, LV58)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION FLOW CONTROL VALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	1/1	RTLS: 1/1
LIFTOFF:	1/1	TAL: 1/1
ONORBIT:	3/3	AOA: 1/1
DEORBIT:	3/3	ATO: 1/1
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC280-0017-0015, -0361

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKING H2 IS A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/27/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2211 ABORT: 1/1

ITEM: GH2 PRESSURIZATION DISCONNECT (PD5)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION (ORB/ET) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. FAILURE DURING
POWERED ASCENT WILL CUT OFF GH2 FLOW TO THE LH2 TANK. SUBSEQUENT
LOSS OF ULLAGE PRESSURE WILL CAUSE MULTIPLE ENGINE SHUTDOWN AND
LOSS OF VEHICLE. NO REDUNDANCY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2212 ABORT: 1/1

ITEM: GH2 PRESSURIZATION DISCONNECT (PD5)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION (ORB/ET) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THRUST FROM ESCAPING H2 AT ET SEP CAN CAUSE RECONTACT WITH ET AND DESTRUCTION OF VEHICLE. VEHICLE CAN BE DESTROYED ON ENTRY IF TPS TILES ARE DAMAGED IN RECONTACT WITH ET. RECONTACT WITH ET CAN DESTROY VEHICLE IN ABORTS, EXCEPT RTLS WHERE AERO FORCES WILL PREVENT RECONTACT. FAILURE NA FOR PRELAUNCH, DISCONNECT IS NOT REQUIRED TO CLOSE. NO REDUNDANCY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2213 ABORT: 1/1

ITEM: GH2 PRESSURIZATION DISCONNECT (PD5)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION (ORB/ET) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0391-0001

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL ALLOW HELIUM LEAKAGE AND WILL CAUSE LAUNCH DELAY. FAILURE DURING ASCENT WILL ALLOW LEAKAGE OF H2 AND CREATE A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2221 ABORT: /NA

ITEM: LH2 TANK GROUND PRE-PRESS DISCONNECT (PD10)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) LH2 TANK GROUND PRE-PRESSURIZATION (ORB/GND) DISCONNECT (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL PREVENT PREPRESSURIZATION OF LH2 TANK AND CAUSE LAUNCH DELAY. FAILURE DOES NOT APPLY TO OTHER PHASES SINCE THE DISCONNECT/CHECK VALVE IS ONLY REQUIRED TO OPEN DURING PRELAUNCH. NO REDUNDANCY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/28/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	2222	ABORT:	2/1R

ITEM: LH2 TANK GROUND PRE-PRESS DISCONNECT (PD10)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED, EXTERNAL
LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) LH2 TANK GROUND PRE-PRESSURIZATION (ORB/GND) DISCONNECT
(ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

SECOND ASSOCIATED FAILURE WILL ALLOW GH2 TO ESCAPE OVERBOARD.
VEHICLE CAN BE DESTROYED BY FIRE OR EXPLOSION OF ESCAPING GH2 OR
STRUCTURAL FAILURE OF LH2 TANK FROM LOSS OF ULLAGE PRESSURE.
ONLY ONE REDUNDANT COMPONENT, SO LOSS OF ALL REDUNDANCY SIMILARLY
CAUSES LOSS OF VEHICLE. LOSS OF REDUNDANCY IS NOT READILY
DETECTABLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/29/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2231 ABORT: 1/1

ITEM: GH2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
(PD16)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION MANIFOLD TEST POINT COUPLING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME276-0032-0017

CAUSES: CONTAMINATION, VIBRATION, PROCEDURAL ERROR

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD DURING PRELAUNCH OR
POWERED FLIGHT. NO HAZARD AFTER MPS DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/29/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2241 ABORT: 2/1R

ITEM: LH2 PREPRESSURIZATION DISCONNECT CHECK VALVE TEST
PORT (TP10)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) LH2 PREPRESSURIZATION DISCONNECT CHECK VALVE TEST PORT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: V070-415446-001

CAUSES: CONTAMINATION, VIBRATION, PROCEDURAL ERROR

EFFECTS/RATIONALE:
SECOND ASSOCIATED FAILURE WILL ALLOW LEAKAGE OF H2, CREATING A
FIRE/EXPLOSION HAZARD DURING PRELAUNCH OF POWERED FLIGHT.
LOSS OF REDUNDANCY IS NOT READILY DETECTABLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/29/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2251 ABORT: 1/1

ITEM: GH2 PRESSURIZATION DUAL CHECK VALVE TEST PORT
(TP21,TP22,TP23)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION DUAL CHECK VALVE (INLET) TEST PORT (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: V070-415448-001

CAUSES: CONTAMINATION, VIBRATION, PROCEDURAL ERROR

EFFECTS/RATIONALE:
LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS
DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/29/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2261 ABORT: 1/1

ITEM: LH2 FEED DISCONNECT VALVE (PD2)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 FEED (ORB/ET) DISCONNECT VALVE (ORB HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	HDW/FUNC
		ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0051, -0411, -0431

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PREIGNITION FAILURE WILL PREVENT TANK FILL AND/OR LH2 RECIRCULATION AND THEREBY DELAY LAUNCH. FAILURE DURING TANK FILL MAY CAUSE RUPTURE OF FEEDLINE MANIFOLD, RELEASING LH2 AND CREATING A FIRE/EXPLOSION HAZARD. FAILURE DURING ENGINE BURN WILL CUT OFF FUEL FLOW TO THE ENGINES, RESULTING IN LOSS OF VEHICLE. NO REDUNDANCY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/29/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2262 ABORT: 1/1

ITEM: LH2 FEED DISCONNECT VALVE (PD2)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 FEED (ORB/ET) DISCONNECT VALVE (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0051, -0411, -0431

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE WILL ALLOW THRUST FROM ESCAPING H2 TO ROTATE THE VEHICLE AFTER ET SEPARATION AND CAUSE RECONTACT WITH THE ET. IMPACT COULD CAUSE LOSS OF VEHICLE DIRECTLY OR DAMAGE TO TPS TILES CAUSED BY IMPACT MAY DESTROY THE VEHICLE DURING ENTRY. RECONTACT AFTER RTLS ET SEP IS PREVENTED BY AERO FORCES.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/29/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2263 ABORT: 1/1

ITEM: LH2 FEED DISCONNECT VALVE (PD2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 FEED (ORB/ET) DISCONNECT VALVE (ORBITER HALF)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0051, -0411, -0431

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD. LEAKING LH2 CAN DAMAGE
TPS TILES AND CAUSE LOSS OF VEHICLE DURING ENTRY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/29/86
SUBSYSTEM: MPS
MDAC ID: 2271

HIGHEST CRITICALITY
FLIGHT: 1/1
ABORT: 1/1

HDW/FUNC

ITEM: LH2 PREVALVE (PV4,PV5,PV6)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0006

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PREIGNITION FAILURE WILL PREVENT ENGINE START. FAILURE AFTER
ENGINE START WILL DEPRIVE THE ENGINE OF LH2 AND CAUSE IT TO
EXPLODE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2272 ABORT: 3/3

ITEM: LH2 PREVALVE (PV4,PV5,PV6)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0006

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
PREMATURE OPENING DURING PRELAUNCH MAY CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/30/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	2273	ABORT:	1/1

ITEM: LH2 PREVALVE (PV4,PV5,PV6)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0006

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS
DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2274 ABORT: 1/1

ITEM: LH2 PREVALVE (PV4,PV5,PV6)
FAILURE MODE: FAIL TO RELIEVE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0006

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE COULD ALLOW PROPELLANT FEEDLINE TO RUPTURE, CAUSING
DAMAGE TO OTHER COMPONENTS AND POSSIBLE DESTRUCTION OF THE
VEHICLE. NO HAZARD DURING PERIODS WHEN THE VALVE IS OPEN.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2275 ABORT: 3/3

ITEM: LH2 PREVALVE (PV4,PV5,PV6)
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0396-0006

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2281 ABORT: 1/1

ITEM: LH2 17 INCH ORBITER DISCONNECT TEST PORT
(TP11,TP12)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 17 INCH ORBITER DISCONNECT TEST PORT (2)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0389-0401, -0431

CAUSES: CONTAMINATION, VIBRATION, PROCEDURAL ERROR

EFFECTS/RATIONALE:
LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS
DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: _____
SUBSYSTEM: MPS
MDAC ID: 2291

HIGHEST CRITICALITY
FLIGHT: 1/1
ABORT: 1/1

HDW/FUNC

ITEM: LH2 FEEDLINE MANIFOLD (MA2)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 FEEDLINE MANIFOLD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0005

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

RUPTURE OF THE LINE DURING PRELAUNCH WILL ALLOW LH2 TO ESCAPE, CREATING A FIRE/EXPLOSION HAZARD. RUPTURE DURING POWERED FLIGHT WILL CAUSE MULTIPLE ENGINE SHUTDOWN OR EXPLOSION AND LOSS OF VEHICLE. ONORBIT FAILURE CAN CAUSE OUTRIGHT DESTRUCTION OF THE VEHICLE OR DAMAGE THAT COULD DESTROY THE VEHICLE ON ATTEMPTING TO LAND.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/31/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2292 ABORT: 1/1

ITEM: LH2 FEEDLINE MANIFOLD (MA2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 FEEDLINE MANIFOLD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0005

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

FAILURE DURING PRELAUNCH WILL CAUSE LAUNCH DELAY. FAILURE DURING POWERED FLIGHT COULD CAUSE LOSS OF VEHICLE BECAUSE OF INCORRECT PUMP INLET FLOW CONDITIONS. ENGINES MAY SHUT DOWN OR EXPLODE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2293 ABORT: 3/3

ITEM: LH2 FEEDLINE MANIFOLD (MA2)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 FEEDLINE MANIFOLD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0005

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING PRESTART
CONDITIONING. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL
BE PREVENTED AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2301 ABORT: 1/1

ITEM: LH2 17 INCH FEEDLINE (FH7)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 17 INCH FEEDLINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0001

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

RUPTURE OF THE LINE DURING PRELAUNCH WILL ALLOW LH2 TO ESCAPE, CREATING A FIRE/EXPLOSION HAZARD. RUPTURE DURING POWERED FLIGHT WILL CAUSE MULTIPLE ENGINE SHUTDOWN OR EXPLOSION AND LOSS OF VEHICLE. ONORBIT FAILURE CAN CAUSE OUTRIGHT DESTRUCTION OF THE VEHICLE OR DAMAGE THAT COULD DESTROY THE VEHICLE ON ATTEMPTING TO LAND.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/31/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2302 ABORT: 1/1

ITEM: LH2 17 INCH FEEDLINE (FH7)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 17 INCH FEEDLINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0001

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. FAILURE DURING POWERED FLIGHT COULD CAUSE LOSS OF VEHICLE FROM ENGINE EXPLOSION OR SHUTDOWN DUE TO VIOLATION OF TURBOPUMP INLET FLOW CONDITION REQUIREMENTS.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2303 ABORT: 3/3

ITEM: LH2 17 INCH FEEDLINE (FH7)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 17 INCH FEEDLINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0001

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING PRESTART
CONDITIONING. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL
BE PREVENTED AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2311 ABORT: 1/1

ITEM: LH2 12 INCH FEEDLINE (FH8,FH9,FH10)
FAILURE MODE: RUPTURE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 12 INCH FEEDLINE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE

PART NUMBER: MC271-0073-0202,-0203,-0204,-0302,-0303-,0304

CAUSES: OVERPRESSURIZATION

EFFECTS/RATIONALE:

RUPTURE DURING PRELAUNCH CAN DESTROY THE VEHICLE. ESCAPING LH2 IS A FIRE/EXPLOSION HAZARD. FAILURE DURING POWERED FLIGHT WILL CAUSE ENGINE SHUTDOWN OR EXPLOSION AND LOSS OF VEHICLE. ONORBIT FAILURE CAN DESTROY THE VEHICLE OUTRIGHT OR CAUSE DAMAGE THAT WILL MAKE A SAFE LANDING IMPOSSIBLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2312 ABORT: 1/1

ITEM: LH2 12 INCH FEEDLINE (FH8,FH9,FH10)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 12 INCH FEEDLINE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0202,-0203,-0204,-0302,-0303-,0304

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
PRELAUNCH FAILURE WILL CAUSE LAUNCH DELAY. FAILURE DURING
POWERED FLIGHT COULD CAUSE ENGINE SHUTDDOWN OR ENGINE EXPLOSION
AND LOSS OF VEHICLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/19/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	2313	ABORT:	3/3

ITEM: LH2 12 INCH FEEDLINE (FH8,FH9,FH10)
FAILURE MODE: LOSS OF INSULATING VACUUM

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 12 INCH FEEDLINE (3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC271-0073-0202,-0203,-0204,-0302,-0303-,0304

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

FAILURE WOULD ALLOW LH2 TEMPERATURE TO INCREASE DURING PRESTART
CONDITIONING. IF LH2 TEMPERATURE IS TOO HIGH, ENGINE START WILL
BE PREVENTED AND LAUNCH WILL BE DELAYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2321 ABORT: 1/1

ITEM: LH2 FEEDLINE RELIEF SHUTOFF VALVE (PV8)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF SHUTOFF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	3/3
LIFTOFF:	1/1		TAL:	1/1
ONORBIT:	3/3		AOA:	1/1
DEORBIT:	3/3		ATO:	1/1
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0406-0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE TO OPEN AT MECO WILL ALLOW PRESSURE IN THE PROPELLANT
MANIFOLD AND LINES TO INCREASE AND CAUSE THE LINE TO BURST AND
DESTROY THE VEHICLE.
VALVE IS NOT REQUIRED TO OPEN PRELAUNCH.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2322 ABORT: 1/1

ITEM: LH2 FEEDLINE RELIEF SHUTOFF VALVE (PV8)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF SHUTOFF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0406-0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE WILL ALLOW LH2 TO ESCAPE THE VEHICLE THROUGH THE FEEDLINE RELIEF VALVE AFTER MAIN ENGINE START, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2323 ABORT: 1/1

ITEM: LH2 FEEDLINE RELIEF SHUTOFF VALVE (PV8)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF SHUTOFF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0406-0002

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF LH2 IS A FIRE/EXPLOSION HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/05/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	2331	ABORT:	1/1

ITEM: LH2 FEEDLINE RELIEF LINE TEST PORT (TP25)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF LINE TEST PORT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: V070-415426-001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, PROCEDURAL ERROR

EFFECTS/RATIONALE:

SINCE MPS DUMP IS ONLY A PARTIAL ONE FOR RTLS AND TAL ABORTS, THE FAILURE WILL ALLOW LEAKAGE OF LH2/GH2 AND CREATE A FIRE/EXPLOSION HAZARD DURING RTLS AND TAL ENTRY, LANDING AND POST-LANDING. SINCE THE FEEDLINE RELIEF VALVE IS OPENED AT MECO, THERE IS NO DANGER PRIOR TO MECO. NO DANGER AFTER A COMPLETE MPS DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2341 ABORT: 1/1

ITEM: LH2 FEEDLINE MANIFOLD RELIEF VALVE (RV6)
FAILURE MODE: FAIL TO OPEN (RELIEVE)

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE MANIFOLD RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0501-0002

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

FAILURE WILL ALLOW PRESSURE TO INCREASE IN THE FEEDLINE MANIFOLD
UNTIL IT BURSTS AND THE VEHICLE WILL BE DESTROYED.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2342 ABORT: 3/3

ITEM: LH2 FEEDLINE MANIFOLD RELIEF VALVE (RV6)
FAILURE MODE: FAIL TO REMAIN CLOSED, INTERNAL LEAKAGE, FAIL TO
CLOSE (RESEAT)

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE MANIFOLD RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0501-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE IS NOT A HAZARD. THE RELIEF VALVE HAS NO HYDROGEN
PRESSURE ON IT UNTIL THE ISOLATION VALVE IS OPENED AT MECO.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2343 ABORT: 3/3

ITEM: LH2 FEEDLINE MANIFOLD RELIEF VALVE (RV6)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE MANIFOLD RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0501-0002

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FAILURE IS NOT A HAZARD. THE RELIEF VALVE HAS NO HYDROGEN
PRESSURE ON IT UNTIL THE ISOLATION VALVE IS OPENED AT MECO.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86
SUBSYSTEM: MPS
MDAC ID: 2351

HIGHEST CRITICALITY
FLIGHT: 3/3
ABORT: 3/3

HDW/FUNC

ITEM: LH2 DUMP PRESSURIZATION ORIFICE (RP10)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 DUMP PRESSURIZATION ORIFICE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: V070-415135-001

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

FAILURE IS NOT A HAZARD, BUT MAY FORCE A SECOND VACUUM INERTING
OF MPS LINES DURING ORBITAL OPERATIONS.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2352 ABORT: 1/1

ITEM: LH2 DUMP PRESSURIZATION ORIFICE (RP10)
FAILURE MODE: EXTERNAL LEAK

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 DUMP PRESSURIZATION ORIFICE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: V070-415135-001

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF HYDROGEN WILL CREATE A FIRE/EXPLOSION HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2361 ABORT: 3/3

ITEM: LH2 FEEDLINE RELIEF FLAME ARRESTOR (FL1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF FLAME ARRESTOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: V070-451430-004

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
FAILURE IS NOT A HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2371 ABORT: 3/3

ITEM: LH2 PRESSURIZATION LINE VENT VALVE (LV52)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) HYDROGEN VACUUM INERTING SYSTEM
- 3) LH2 PRESSURIZATION LINE VENT VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FAILURE DOES NOT CREATE A HAZARDOUS CONDITION. GASEOUS HYDROGEN
WILL BE TRAPPED IN THE ET PRESSURIZATION MANIFOLD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2372 ABORT: 3/3

ITEM: LH2 PRESSURIZATION LINE VENT VALVE (LV52)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) HYDROGEN VACUUM INERTING SYSTEM
- 3) LH2 PRESSURIZATION LINE VENT VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0002

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FAILURE DOES NOT CREATE A HAZARDOUS CONDITION.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2373 ABORT: 1/1

ITEM: LH2 PRESSURIZATION LINE VENT VALVE (LV52)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) HYDROGEN VACUUM INERTING SYSTEM
- 3) LH2 PRESSURIZATION LINE VENT VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF H2 IS A FIRE/EXPLOSION HAZARD. NO HAZARD AFTER MPS
DUMP & PURGE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 2381 ABORT: 1/1

ITEM: LH2 FEED RTLS INBOARD VALVE (PV17)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 FEED RTLS INBOARD VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0023,-0033,-0043,-0053

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE WILL PREVENT DUMP OF LH2 DURING RTLS. HYDROGEN WILL VENT THROUGH THE RELIEF VALVE DURING DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD. NO HAZARD IN ANY OTHER PHASE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	2382	ABORT:	2/1R

ITEM: LH2 FEED RTLS INBOARD VALVE (PV17)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 FEED RTLS INBOARD VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0023,-0033,-0043,-0053

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF A REDUNDANT COMPONENT (OUTBOARD VALVE) WILL ALLOW LH2 TO ESCAPE THE VEHICLE CREATING A FIRE/EXPLOSION HAZARD. LOSS OF LH2 WILL CAUSE ENGINES TO SHUT DOWN EARLY, RESULTING IN LOSS OF VEHICLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2383 ABORT: 1/1

ITEM: LH2 FEED RTLS INBOARD VALVE (PV17)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 FEED RTLS INBOARD VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0023,-0033,-0043,-0053

CAUSES: PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF LH2 IS A FIRE/EXPLOSION HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/07/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	2391	ABORT:	1/1

ITEM: LH2 FEED RTLS OUTBOARD VALVE (PV18)
FAILURE MODE: FAIL TO OPEN, FAIL TO REMAIN OPEN

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 FEED RTLS OUTBOARD VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0024,-0034,-0044,-0054

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE WILL PREVENT DUMP OF LH2 DURING RTLS. HYDROGEN WILL VENT THROUGH THE RELIEF VALVE DURING DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD. NO HAZARD IN ANY OTHER PHASE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 2392 ABORT: 2/1R

ITEM: LH2 FEED RTLS OUTBOARD VALVE (PV18)
FAILURE MODE: FAIL TO CLOSE, FAIL TO REMAIN CLOSED

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 FEED RTLS OUTBOARD VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [F]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0024,-0034,-0044,-0054

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF A REDUNDANT COMPONENT (INBOARD VALVE) WILL ALLOW LH2 TO ESCAPE THE VEHICLE AND CREATE A FIRE/EXPLOSION HAZARD. LOSS OF LH2 WILL CAUSE ENGINES TO SHUT DOWN EARLY, RESULTING IN LOSS OF VEHICLE.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 2393 ABORT: 1/1

ITEM: LH2 FEED RTLS OUTBOARD VALVE (PV18)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: W.J.MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) LH2 SYSTEM
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 FEED RTLS OUTBOARD VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0395-0024,-0034,-0044,-0054

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LEAKAGE OF LH2 IS A FIRE/EXPLOSION HAZARD.

REFERENCES: VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/86
SUBSYSTEM: MPS
MDAC ID: 3010

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 1/1R

ITEM: ENGINE HELIUM SUPPLY CHECK VALVE (CV1,CV2,CV3)
FAILURE MODE: FAILS TO CLOSE, OR REMAIN CLOSED

LEAD ANALYST: M.L.MCNEELY
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) E1, 2, 3 HELIUM SUPPLY
- 3) CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME284-0472-0002

CAUSES: POPPET SEAT FAILURE, CONTAMINATION, SPRING BREAKAGE

EFFECTS/RATIONALE:

TWO SEPARATE FAILURES OF UNLIKE PARTS MUST OCCUR FOR LOSS OF HELIUM TO AN ENGINE FROM THE SUPPLY VIA THIS PATH. LOSS OF ALL REDUNDANCY MAY RESULT IN THE LOSS OF HELIUM TO AN ENGINE CAUSING SHUTDOWN.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATICS, VS70-415001, 006, 007 & 008. BOOSTER SYS'S. BRIEFS, JSC-19401, 1-OCT.1984; RI SPEC DWG FOR ME284-0472 PARTS.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 3011 ABORT: 3/3

ITEM: ENGINE HELIUM SUPPLY CHECK VALVE (CV1,CV2,CV3)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) E1, 2, 3 HELIUM SUPPLY
- 3) CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME284-0472-0002

CAUSES: BLOCKAGE (GROSS CONTAMINATION)

EFFECTS/RATIONALE:

FAILURE TO OPEN PREVENTS PRESSURIZATION OF AN ENGINE HELIUM SUPPLY TANK WHICH IS EASILY DETECTABLE DURING PRELAUNCH. FAILURE TO OPEN AT ANY OTHER TIME HAS NO EFFECT.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATICS, VS70-415001, 006, 007 & 008. BOOSTER SYS'S. BRIEFS, JSC-19401, 1-OCT.1984; RI SPEC DWG FOR ME284-0472 PARTS.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 3020 ABORT: 2/1R

ITEM: HELIUM SUPPLY DISCONNECT(ORB/GND, ORB HALF), (PD8)
FAILURE MODE: FAILS TO CLOSE, OR REMAIN CLOSED

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) INLET BOTTLE SUPPLY FROM GSE
- 3) ORBITER HALF DISCONNECT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: LEFT T-O UMBILICAL PANEL
PART NUMBER: MC276-0003-0006 (TYPE I)

CAUSES: POPPET SEAT FAILURE, CONTAMINATION, SPRING BREAKAGE

EFFECTS/RATIONALE:

TWO SEPARATE FAILURES OF UNLIKE PARTS MUST OCCUR (CV1-3 AND PD-8 POPPET SEAT) FOR LOSS OF HELIUM FROM THE SUPPLY TANK THROUGH THE DISCONNECT. LOSS OF ALL REDUNDANCY MAY RESULT IN THE LOSS OF HELIUM TO AN ENGINE CAUSING SHUTDOWN.

REFERENCES: RI MAIN PROPULSION SYS. SCHEMATIC, VS70-41500X; RI SPEC DWG FOR MC276-0003 PARTS; BOOSTER SYSTEM BRIEFS, JSC19401, 1-OCT.1984.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 3021 ABORT: 2/1R

ITEM: HELIUM SUPPLY DISCONNECT (ORB/GND, ORB HALF),
(PD8)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) INLET BOTTLE SUPPLY FROM GSE
- 3) ORBITER HALF DISCONNECT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC276-0003-0006 (TYPE 1)

CAUSES: SWIVEL SEAL FAILURE; SCRATCHED OR GOUGED SWIVEL AT SEAL INTERFACE

EFFECTS/RATIONALE:

TWO SEPARATE FAILURES OF UNLIKE PARTS MUST OCCUR (CV1-3 AND PD-8 SWIVEL SEAL) FOR LOSS OF HELIUM FROM THE SUPPLY TANK THROUGH THE DISCONNECT. LOSS OF ALL REDUNDANCY MAY RESULT IN THE LOSS OF HELIUM TO AN ENGINE CAUSING SHUTDOWN.

REFERENCES: RI MAIN PROPULSION SYS. SCHEMATIC, VS70-41500X; RI SPEC DWG FOR MC276-0003 PARTS; BOOSTER SYSTEM BRIEFS, JSC19401, 1-OCT.1984.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/09/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	3030	ABORT:	2/1R

ITEM: TEST PORT (TP8)
FAILURE MODE: LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SYSTEM
- 2) HELIUM FILL LINE
- 3) TEST PORT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: V070-415585-002

CAUSES: SEAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE SEAL AT THE TEST PORT (TP8) PLUG IS FUNCTIONALLY THE SAME AS THE QD (PD8) POPPET OR EXTERNAL LEAKAGE FAILURES. TWO SEPARATE FAILURES OF UNLIKE PARTS MUST OCCUR (CV1-3 AND THE TP-8 SEAL) FOR LOSS OF HELIUM FROM THE SUPPLY TANK. LOSS OF ALL REDUNDANCY MAY RESULT IN LOSS OF HELIUM SUPPLY TO AN ENGINE.

REFERENCES: RI MPS SCHEMATICS, VS70-41500X; RI SPEC DWG V070-415585-002

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3040 ABORT: 1/1

ITEM: 17.3 CU. FT. HELIUM SUPPLY TANK (TK6, 8, 10)
FAILURE MODE: RAPID LEAK

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) HELIUM SUPPLY TANKS
- 3) 17.3 FT3 TANK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: PAYLOAD BAY; UNDER PLB LINER
PART NUMBER: MC282-0082-0001

CAUSES: MANUFACTURING DEFECT, FATIGUE AT WELD JOINT, SEAL
FAILURE

EFFECTS/RATIONALE:

RAPID LOSS OF HELIUM MAY LEAD TO LOSS OF AN ENGINE DURING ASCENT.
TANKS INSTALLED UNDER PAYLOAD BAY LINER. MAY REQUIRE REMOVAL OF
PAYLOADS FOR ACCESS IF LEAKAGE IS ISOLATED BEFORE FLIGHT.

REFERENCES: RI MPS SCHEMATIC VS7041500X; RI SPEC DWG MC284-0082

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3060 ABORT: 1/1

ITEM: PRESSURE TAP PORT (TP26,27,28)
FAILURE MODE: RAPID LEAK

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SYSTEM
- 2) ENGINE HELIUM SUPPLY
- 3) TEST PORT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: V070-415790-001

CAUSES: SEAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE SEAL AT THE TEST PORT (TP26, 27 OR 28) IS FUNCTIONALLY THE SAME AS A RAPID LEAK IN A HELIUM SUPPLY TANK. LOSS OF ALL REDUNDANCY MAY RESULT IN LOSS OF HELIUM SUPPLY TO AN ENGINE.

REFERENCES: RI MPS SCHEMATIC, VS70-41500X; RI SPEC DWG V070-415790-001

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 3070 ABORT: 3/3

ITEM: ENGINE HELIUM SUPPLY CHECK VALVE
(CV25,26;36,37;41,42)
FAILURE MODE: FAILS TO CLOSE, OR REMAIN CLOSED

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SYSTEM
- 2) ENGINE HELIUM SUPPLY REG INLET
- 3) CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME284-0472-0002

CAUSES: POPPET SEAT FAILURE, CONTAMINATION, SPRING BREAKAGE

EFFECTS/RATIONALE:

CHECK VALVE IS NORMALLY OPEN DURING ENGINE OPERATION. FAILING TO CLOSE IS A MODE ONLY CONSIDERED AFTER LOSS OF HELIUM IN ONE SYSTEM FOLLOWED BY AN ATTEMPT TO INTERCONNECT FROM ANOTHER SUPPLY.

REFERENCES: RI MPS SCHEMATIC VS70-41500X; RI SPEC DWG MC284-0472; BOOSTER SYS. BRIEFS, JSC 19401, 1-OCT.1984.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 3071 ABORT: 2/1R

ITEM: ENGINE HELIUM SUPPLY CHECK VALVE
(CV25,26;36,37;41,42)
FAILURE MODE: FAILS TO OPEN, OR REMAIN OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SYSTEM
- 2) ENGINE HELIUM SUPPLY REG INLET
- 3) CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	2/1R
LIFTOFF:	3/2R		TAL:	2/1R
ONORBIT:	3/3		AOA:	2/1R
DEORBIT:	3/3		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME284-0472-0002

CAUSES: GROSS CONTAMINATION

EFFECTS/RATIONALE:

FAILURE OF EITHER CHECK VALVE IN THE REDUNDANT REG PATHS IS NOT
DETECTABLE DURING THE HELIUM USAGE PERIOD. ONLY WHEN BOTH FAIL
IS THE LOSS OF REDUNDANCY APPARENT.

REFERENCES: RI MPS SCHEMATIC VS70-41500X; RI SPEC DWG MC284-
0472; BOOSTER SYS. BRIEFS, JSC 19401, 1-OCT.1984.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 3080 ABORT: 2/1R

ITEM: ENGINE HELIUM SUPPLY FILTER - PANEL A;B
(FL2,6;3,7;4,8)
FAILURE MODE: RESTRICTED FLOW, BLOCKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) FILTER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME286-0056-0001

CAUSES: GROSS CONTAMINATION

EFFECTS/RATIONALE:

RESTRICTED FLOW OR BLOCKAGE MAY BE INDICATED BY REG OUT PRESSURE V41P1(X)54, (PANEL A), V41P1(X)53, (PANEL B) DEGRADED OR ZERO. HOWEVER, REG PRESSURE AS STATED IS NOT DEFINITIVE FOR THIS FILTER FAILURE MODE.

REFERENCES: RI MPS SCHEMATIC, VS7041500X; RI SPEC DWG ME286-0056.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 3081 ABORT: 2/1R

ITEM: ENGINE HELIUM SUPPLY FILTER - PANEL A;B
(FL2,6;3,7;4,8)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A, B
- 3) FILTER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME286-0056-0001

CAUSES: SEAL FAILURE

EFFECTS/RATIONALE:

TWO SEPARATE SEALS (PER FILTER) MUST FAIL FOR EXTERNAL LEAKAGE TO OCCUR. LEAKAGE AT THIS POINT CANNOT BE DISTINGUISHED FROM LEAKAGE ABOVE THE PANEL A INLET CHECK VALVE (CV26,37,42), OR PANEL B (CV25,36,41).

REFERENCES: RI MPS SCHEMATIC, VS7041500X; RI SPEC DWG ME286-0056.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/10/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/2
MDAC ID:	3082	ABORT:	1/1

ITEM: ENGINE HELIUM SUPPLY FILTER - PANEL A;B
(FL2,6;3,7;4,8)
FAILURE MODE: STRUCTURAL FAILURE (ELEMENT COLLAPSE)

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A, B
- 3) FILTER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME286-0056-0001

CAUSES: HIGH DELTA P ACROSS THE ELEMENT CAUSED BY GROSS
CONTAMINATION.

EFFECTS/RATIONALE:

POSSIBLE CONTAMINATION OF ALL DOWNSTREAM COMPONENTS. WORST CASE
EFFECTS CAUSE ENGINE SHUTDOWN. ELEMENT DESIGN DELTA P
REQUIREMENT IS 25% OF THE OPERATING PRESSURE (MINIMUM) OR 1125
PSID. WORST CASE DELTA P COULD BE AS HIGH AS 4500 PSID.

REFERENCES: RI MPS SCHEMATIC, VS7041500X; RI SPEC DWG ME286-
0056.

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INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 3090 ABORT: 3/1R

ITEM: ENGINE HELIUM SUPPLY ISOLATION VALVE
(LV1,2;3,4;5,6)
FAILURE MODE: FAILS TO OPEN, OR REMAIN OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ISOLATION VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0403-0017 (099,103&104); -0007 (102) (TYPE V)

CAUSES: FAILURE TO VENT CLOSING PRESSURE THRU PILOT BALL & UPPER SEAT; FAILURE TO SEAL INLET PRESSURE FROM REFERENCE CAVITY; LOSS OF ELECTRICAL SIGNAL; LOSS OF COMMAND SIGNAL (ENTRY PURGE)

EFFECTS/RATIONALE:

FAILURE TO OPEN OR REMAIN OPEN IS EASILY RECOGNIZABLE. SHOULD THE VALVE FAIL TO REMAIN OPEN DURING ENGINE OPERATION A REDUNDANT SUPPLY ROUTE IS AVAILABLE, BUT ONLY ONE FAILURE AWAY FROM LOSS OF AN ENGINE FROM LOSS OF HELIUM (MISSION FAILURE). DURING ABORTS, SHOULD THIS SCENARIO OCCUR, LOSS OF THE 2ND ENGINE (SEE MPS GRs) RESULTS IN LOSS OF VEHICLE AND CREW.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEM BRIEFS, JSC 19041, 1-OCT-84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/10/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	3091	ABORT:	3/3

ITEM: ENGINE HELIUM SUPPLY ISOLATION VALVE
(LV1,2;3,4;5,6)
FAILURE MODE: FAILS TO CLOSE, GROSS INTERNAL LEAKAGE.

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ISOLATION VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT

PART NUMBER: MC284-0403-0017 (099,103&104); -0007 (102) (TYPE V)

CAUSES: PLUGGED INTERNAL FILTER; PUSH ROD PIN BROKEN; MAIN PILOT
SPRING OR MAIN POPPET SPRING BROKEN; DAMAGED MAIN POPPET SEAL

EFFECTS/RATIONALE:

FAILURE TO CLOSE HAS NO EFFECT UNLESS FOLLOWED BY A FAILURE
DOWNSTREAM DUE TO LEAKAGE OF OTHER PARTS.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEM BRIEFS, JSC 19041, 1-OCT-
84.

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:		HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/2
MDAC ID:	3092	ABORT:	1/1

ITEM: ENGINE HELIUM SUPPLY ISOLATION VALVE
(LV1,2;3,4;5,6)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ISOLATION VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0403-0017 (099,103&104); -0007 (102) (TYPE V)

CAUSES: FAILURE OF METAL 'V' SEALS OR SOLENOID ASSEMBLY SEALS

EFFECTS/RATIONALE:

GROSS LEAKAGE RESULTS IN LOSS OF ENGINE HELIUM SUPPLY TO A GIVEN ENGINE. WORST CASE LEAKAGE MAY RESULT IN ENGINE SHUTDOWN DUE TO LOSS OF HELIUM PURGE. CROSSOVER OF OTHER ENGINE HELIUM SUPPLIES OR PNEUMATIC HELIUM SUPPLY VIA INLET/OUTLET PATH ONLY FEEDS THE LEAK. CROSSOVER (LV10) FROM THE PNEUMATIC SUPPLY TO ENGINE #2 DOWNSTREAM OF THE LEAK IS A SOLUTION, BUT ONLY FOR #2 ENGINE. HOWEVER, LOCATION OF ANY LEAK IS IMPOSSIBLE DURING POWERED FLIGHT.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEM BRIEFS, JSC 19041, 1-OCT-84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/14/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/2R
MDAC ID:	3110	ABORT:	2/1R

ITEM: ENGINE HELIUM PRESSURE REGULATOR (PR1,7;2,8;3,9)
FAILURE MODE: FAILS TO OPEN, REMAIN OPEN, FAILS OUT OF TOLERANCE (LO)

LEAD ANALYST: M.L.MCNEELY

SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) PRESSURE REGULATOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0533-0004

CAUSES: CONTAMINATION OF THE PILOT POPPET ASSEMBLY

EFFECTS/RATIONALE:

REG OUTLET PRESSURE AT ZERO OR DEGRADED BELOW 715 PSI IS EASILY DETECTED. NO ACTION IS NECESSARY AS A REDUNDANT PATH IS AVAILABLE. ENGINE #2 IS UNIQUE IN THAT AN ADDITIONAL PATH IS AVAILABLE DOWNSTREAM OF THE FAILED REGULATOR, HOWEVER, THE CRITICALITY FOR ENGINE #2 IS NOT DIFFERENT FROM ENGINES #1 AND #3.

REFERENCES: RI MAIN PROPULSION SYS SCHEMATIC V270-41500X;
BOOSTER SYSTEM BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
MC284-0533.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3111 ABORT: 1/1

ITEM: ENGINE HELIUM PRESSURE REGULATOR (PR1,7;2,8;3,9)
FAILURE MODE: FAILS OUT OF TOLERANCE (HIGH)

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) PRESSURE REGULATOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0533-0004

CAUSES: REFERENCE PRESSURE AND PILOT FAIL TO SENSE DOWNSTREAM
DEMAND CHANGES; CONTAMINATION OF PILOT ASSEMBLY.

EFFECTS/RATIONALE:

REGULATOR OUTLET PRESSURE PERMANENTLY RISES ABOVE DOWNSTREAM
RELIEF VALVE SETTING. FAILURE MAY RESULT IN LOSS OF ENGINE
HELIUM THROUGH THE OPEN RELIEF VALVE.

REFERENCES: RI MAIN PROPULSION SYS SCHEMATIC V270-41500X;
BOOSTER SYSTEM BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
MC284-0533.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3112 ABORT: 1/1

ITEM: ENGINE HELIUM PRESSURE REGULATOR (PR1,7;2,8;3,9)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) PRESSURE REGULATOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0533-0004

CAUSES: SEAL FAILURE INTERNALLY OR AT REGULATOR PORTS

EFFECTS/RATIONALE:

GROSS LEAKAGE MAY RESULT IN LOSS OF ENGINE HELIUM.

REFERENCES: RI MAIN PROPULSION SYS SCHEMATIC V270-41500X;
BOOSTER SYSTEM BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
MC284-0533.

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3120 ABORT: 1/1

ITEM: ENGINE HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)
FAILURE MODE: FAILS TO CLOSE (RESEAT), OR REMAIN CLOSED

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0398-0005 (OV099,103,104); -0004 (OV102)

CAUSES: MAIN POPPET SEAT FAILURE; PILOT POPPET, MAIN POPPET OR
POPPET SEAT PISTON SPRING FAILURE.

EFFECTS/RATIONALE:

FAILURE TO CLOSE OR RESEAT FIRST REQUIRES A FAILURE (OPEN) OF THE
UPSTREAM REGULATOR ALLOWING THE RELIEF SETTING TO BE REACHED.
FAILURE TO RESEAT MAY THEN RESULT IN DUMPING HELIUM OVERBOARD
CAUSING ENGINE SHUTDOWN SHOULD THE HELIUM SUPPLY BE DEPLETED
PRIOR TO MECO. FAILURE TO REMAIN CLOSED RESULTS IN THE SAME
EFFECT.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATIC, VS70-41500X,
BOOSTER SYSTEMS BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
MC284-0398; SSSH REV C, DWG 10.8 MPS HELIUM SUPPLY

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3121 ABORT: 1/1

ITEM: ENGINE HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0398-005 (OV099,103,104); -004 (OV102)

CAUSES: MAIN POPPET SEAT FAILURE; PILOT POPPET SEAT FAILURE,
SPRING BREAKAGE

EFFECTS/RATIONALE:

FAILURE IS NOT DETECTABLE AT VALVE EXCEPT DURING CHECKOUT.
OCCURANCE DURING POWERED FLIGHT IS MANIFESTED BY HIGHER THAN
USUAL HELIUM CONSUMPTION FOR A GIVEN ENGINE SUPPLY. WORST CASE
LEAKAGE MAY RESULT IN LOSS OF HELIUM SUPPLY TO AN OPERATING
ENGINE CAUSING SHUTDOWN. THIS FAILURE IS FUNCTIONALLY SAME AS
MDAC 3120 EXCEPT IS NOT A RESULT OF FAILURE OF ANOTHER COMPONENT.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATIC, VS70-41500X,
BOOSTER SYSTEMS BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
MC284-0398; SSSH REV C, DWG 10.8 MPS HELIUM SUPPLY

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86
SUBSYSTEM: MPS
MDAC ID: 3122

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: 1/1

ITEM: ENGINE HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0398-005 (OV099,103,104); -004 (OV102)

CAUSES: PLUGGED SENSE LINE; CONTAMINATION OF FILTER IN SENSE
PORT; OR SENSE LINE OPEN

EFFECTS/RATIONALE:

MAY EXCEED BURST PRESSURE SPEC VALUE CAUSING RUPTURE OF VALVE OR
DOWNSTREAM COMPONENTS. FAILURE TO OPEN IS A MODE ONLY CONSIDERED
IF UPSTREAM REGULATOR FAILS HIGH. MAY BE DETECTABLE BY REG OUT
PRESSURE MEASUREMENT V41P1153/54;1253/54;1353/54, GOING
OFFSCALE HIGH.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATIC, VS70-41500X,
BOOSTER SYSTEMS BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
MC284-0398; SSSH REV C, DWG 10.8 MPS HELIUM SUPPLY

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3123 ABORT: 1/1

ITEM: ENGINE HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) RELIEF VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT

PART NUMBER: MC284-0398-005 (OV099,103,104); -004 (OV102)

CAUSES: SEAL LEAKAGE AT VALVE INLET OR THRU INTERNAL SEALS

EFFECTS/RATIONALE:

WORST CASE LEAKAGE MAY RESULT IN DEPLETION OF ENGINE HELIUM SUPPLY CAUSING SHUTDOWN.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATIC, VS70-41500X,
BOOSTER SYSTEMS BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
MC284-0398; SSSH REV C, DWG 10.8 MPS HELIUM SUPPLY

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/23/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3130 ABORT: 1/1

ITEM: ENGINE HELIUM SUPPLY RELIEF VALVE SENSE LINE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) RELIEF VALVE
- 4) SENSE LINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: UNKNOWN

CAUSES: CRACKED LINE, LOOSE OR BROKEN B-NUT

EFFECTS/RATIONALE:

FAILURE COMPROMISES THE ABILITY OF THE RELIEF VALVE TO SENSE AN OVERPRESSURE CAUSED BY A FAILED (OPEN) REGULATOR. LOSS OF ALL ABILITY TO SENSE DOWNSTREAM PRESSURE DISABLES THE RELIEF VALVE (SEE MDAC #3122). GROSS LEAKAGE OF THE LINE MAY RESULT IN LOSS OF ENGINE HELIUM CAUSING ENGINE SHUTDOWN.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATIC, VS70-41500X
BOOSTER SYSTEM BRIEFS, JSC-19401, 1-OCT-84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/24/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 3140 ABORT: 3/3

ITEM: ENGINE REG OUTLET CHECK VLV (CV5,29;6,40;7,45)
FAILURE MODE: FAILS TO CLOSE, OR REMAIN CLOSED

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) REG OUTLET CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME284-0472-0034 (099,103,104); -0014 (OV102)

CAUSES: POPPET SEAT FAILURE; CONTAMINATION; SPRING BREAKAGE

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS ACCOMPANIED BY ANOTHER PARTICULAR FAILURE IN THE SAME FLOW PATH. IF THE PATH HAS BEEN ISOLATED AND A "LEAK" EXISTS BETWEEN THE ISOLATION VALVE (LV1-6) AND THE CHECK VALVE (OPEN RELIEF VALVE), LOSS OF HELIUM COULD RESULT IN ENGINE SHUTDOWN.

REFERENCES: RI MAIN PROPULSION SYS. SCHEMATIC, VS70-41500X;
BOOSTER SYSTEMS BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
ME284-0472

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/24/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 3141 ABORT: 2/1R

ITEM: ENGINE REG OUTLET CHECK VLV (CV5,29;6,40;7,45)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) REG OUTLET CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: ME284-0472-0034 (099,103,104); -0014 (OV102)

CAUSES: BLOCKAGE (GROSS CONTAMINATION)

EFFECTS/RATIONALE:

FAILURE TO OPEN PREVENTS HELIUM FLOW THROUGH 1 LEG OF REDUNDANT PATHS PROVIDED TO EACH ENGINE. FAILURE IS FAIRLY EASY TO DETECT BY REG OUT PRESSURE REACHING LOCKUP VALVE. MEASUREMENT IS UPSTREAM OF THE CHECK VALVE. FAILURE OF BOTH FLOW PATHS (FOR ENGINE 1&3) WOULD CAUSE ENGINE SHUTDOWN. THREE FLOW PATHS ARE AVAILABLE FOR ENGINE 2.

REFERENCES: RI MAIN PROPULSION SYS. SCHEMATIC, VS70-41500X;
BOOSTER SYSTEMS BRIEFS, JSC-19401, 1-OCT-84; RI SPEC DWG FOR
ME284-0472

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3150 ABORT: 1/1

ITEM: ENGINE HELIUM SUPPLY INTERCONNECT INLET VALVE
(LV59,61,63)
FAILURE MODE: FAILS TO OPEN OR REMAIN OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE INTERCONNECT INLET VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT

PART NUMBER: MC284-0403-0017 (OV099,103,104); -0007 TYPE V (102)

CAUSES: FAILURE TO VENT CLOSING PRESSURE THRU PILOT BALL AND
UPPER SEAT; FAILURE TO SEAL INLET PRESSURE FROM REFERENCE CAVITY;
LOSS OF ELECTRICAL SIGNAL.

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS IT BECOMES NECESSARY TO SUPPLY
PNEUMATIC HELIUM TO AN ENGINE HELIUM PURGE SYSTEM. THE LEFT
ENGINE INTERCONNECT INLET VALVE (LV61) IS ALSO CRITICAL TO AFT
COMPARTMENT PURGES DURING RTLS AND TAL ABORT LANDING PHASES.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEMS BRIEFS, JSC19041, 1-OCT-
84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/27/86
SUBSYSTEM: MPS
MDAC ID: 3151

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: ENGINE HELIUM SUPPLY INTERCONNECT INLET VALVE
(LV59,61,63)
FAILURE MODE: FAILS TO CLOSE; GROSS INTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE INTERCONNECT INLET VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0403-0017 (OV099,103,104); -0007 TYPE V (102)

CAUSES: PLUGGED INTERNAL FILTER; PUSH ROD PIN BROKEN; MAIN PILOT SPRING OR MAIN POPPET SPRING BROKEN; DAMAGED MAIN POPPET SEAT.

EFFECTS/RATIONALE:

FAILURE TO CLOSE HAS NO EFFECT. FLOW FROM AN ENGINE SYSTEM IS PREVENTED BY A CHECK VALVE; UNDESIRE FLOW TO AN ENGINE SYSTEM IS PREVENTED BY AN ISOLATION VALVE.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEMS BRIEFS, JSC19041, 1-OCT-84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 3152 ABORT: 3/3

ITEM: ENGINE HELIUM SUPPLY INTERCONNECT INLET VALVE
(LV59,61,63)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE INTERCONNECT INLET VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT

PART NUMBER: MC284-0403-0017 (OV099,103,104); -0007 TYPE V (102)

CAUSES: FAILURE OF METAL 'V' SEALS OR SOLENOID ASSEMBLY SEALS

EFFECTS/RATIONALE:

GROSS LEAKAGE RESULTS IN LOSS OF PNEUMATIC VALVE HELIUM SUPPLY.
WORST CASE LEAKAGE MAY DEplete PNEUMATIC SUPPLY. HOWEVER,
ACCUMULATORS PROVIDE VALVE CLOSING CAPABILITY AFTER MECO.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEMS BRIEFS, JSC19041, 1-OCT-84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/27/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	3160	ABORT:	3/3

ITEM: ENGINE HELIUM SUPPLY INTERCONNECT OUTLET VALVE
(LV60,62,64)
FAILURE MODE: FAILS TO OPEN, OR REMAIN OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE INTERCONNECT OUTLET VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0403-0011 (OV099,103,104); -0001 (102)

CAUSES: FAILURE TO VENT CLOSING PRESSURE THRU PILOT BALL AND
UPPER SEAT; FAILURE TO SEAL INLET PRESSURE FROM REFERENCE CAVITY;
LOSS OF ELECTRICAL SIGNAL

EFFECTS/RATIONALE:
FAILURE HAS NO EFFECT DURING POWERED FLIGHT AS FLIGHT RULES
PREVENT OPENING OUTLET VALVES TO SUPPLY ENGINE HELIUM TO ANOTHER
ENGINE OR TO THE PNEUMATIC SUPPLY SYSTEM DURING THIS PERIOD.
REDUNDANT PATHS ARE AVAILABLE FOR FAILURE TO OPEN DURING MPS DUMP
AND ENTRY.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEMS BRIEFS, JSC19041, 1-OCT-
84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 3161 ABORT: 3/3

ITEM: ENGINE HELIUM SUPPLY INTERCONNECT OUTLET VALVE
(LV60,62,64)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE INTERCONNECT OUTLET VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION:
PART NUMBER:

CAUSES: PLUGGED INTERNAL FILTER; SOLENOID ACTUATOR PIN BROKEN,
MAIN OR PILOT POPPET SEAT FAILURE.

EFFECTS/RATIONALE:

FAILURE TO CLOSE HAS NO EFFECT. UNDESIREDFLOW TO ANOTHER ENGINE
SYSTEM IS PREVENTED BY THE INTERCONNECT INLET VALVE. UNDESIREDFLOW
REVERSE FLOW IS PREVENTED BY A CHECK VALVE. HELIUM FLOW TO THE
PNEUMATIC SYSTEM WILL OCCUR IF THE PNEUMATIC SYSTEM PRESSURE
IS BELOW THAT OF THE ENGINE SYSTEM.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEMS BRIEFS, JSC19041, 1-OCT-
84.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3162 ABORT: 1/1

ITEM: ENGINE HELIUM SUPPLY INTERCONNECT OUTLET VALVE
(LV60,62,64)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE INTERCONNECT OUTLET VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0403-0017 (OV099,103,104); -007 TYPE V (102)

CAUSES: FAILURE OF METAL 'V' SEALS OR SOLENOID ASSEMBLY SEALS

EFFECTS/RATIONALE:

GROSS LEAKAGE RESULTS IN LOSS OF ENGINE HELIUM SUPPLY TO A GIVEN ENGINE. WORST CASE LEAKAGE MAY RESULT IN ENGINE SHUTDOWN DUE TO LOSS OF HELIUM PURGE. THE PROBABILITY OF METALLIC TYPE SEAL FAILURE IS UNKNOWN.

REFERENCES: RI MPS SCHEMATIC, VS70-415001 (102); VS70-41500X.
RI SPEC DWG MC284-0403. BOOSTER SYSTEMS BRIEFS, JSC19041, 1-OCT-84.

**INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

DATE:	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM: MPS	FLIGHT:	3/3
MDAC ID: 3170	ABORT:	3/3

ITEM: ENGINE HELIUM INTERCONNECT CHECK VALVE-PANEL
OUTLET (CV28,39,44)
FAILURE MODE: FAILS TO CLOSE, REMAIN CLOSED

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE HE INTERCONNECT CHECK VALVE- OUTLET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0472-0002

CAUSES: POPPET SEAT FAILURE; CONTAMINATION; SPRING BREAKAGE

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT. OUTLET INTERCONNECT VALVE PREVENTS
UNDESIRABLE REVERSE FLOW.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATICS, VS70-415001,
006, 007 & 008. BOOSTER SYS'S. BRIEFS, JSC-19401, 1-OCT.1984; RI
SPEC DWG FOR ME284-0472 PARTS.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 3171 ABORT: 3/3

ITEM: ENGINE HELIUM INTERCONNECT CHECK VALVE-PANEL
OUTLET (CV28,39,44)
FAILURE MODE: FAILS TO OPEN, OR REMAIN OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE HE INTERCONNECT CHECK VALVE- OUTLET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0472-0002

CAUSES: GROSS CONTAMINATION

EFFECTS/RATIONALE:

CHECK VALVE IS NORMALLY CLOSED DURING POWERED FLIGHT. FLOW THROUGH VALVE IS ONLY REQUIRED DURING MPS DUMP AND ENTRY PURGE DURING WHICH OTHER FLOW PATHS ARE AVAILABLE.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATICS, VS70-415001, 006, 007 & 008. BOOSTER SYS'S. BRIEFS, JSC-19401, 1-OCT.1984; RI SPEC DWG FOR ME284-0472 PARTS.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 3180 ABORT: 3/3

ITEM: ENGINE HELIUM INTERCONNECT CHECK VALVE-PANEL INLET
(CV27,38,43)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE HELIUM INTERCONNECT CHECK VALVE- INLET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0472-0002

CAUSES: POPPET SEAT FAILURE; CONTAMINATION; SPRING BREAKAGE

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT. INLET INTERCONNECT VALVE PREVENTS
UNDESIRABLE REVERSE FLOW.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATICS, VS70-415001,
006, 007 & 008. BOOSTER SYS'S. BRIEFS, JSC-19401, 1-OCT.1984; RI
SPEC DWG FOR ME284-0472 PARTS.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/07/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 3181 ABORT: 1/1

ITEM: ENGINE HELIUM INTERCONNECT CHECK VALVE-PANEL INLET
(CV27,38,43)
FAILURE MODE: FAILS TO OPEN, OR REMAIN OPEN

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SUPPLY
- 2) ENGINE HELIUM REG PANEL A,B
- 3) ENGINE HELIUM INTERCONNECT CHECK VALVE- INLET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: MC284-0472-0002

CAUSES: GROSS CONTAMINATION

EFFECTS/RATIONALE:

CHECK VALVE IS NORMALLY CLOSED DURING POWERED FLIGHT. FLOW THROUGH CHECK VALVE IS REQUIRED NOMINALLY AT ET SEP (AUTO SEQUENCE) AND DURING PURGE PREP/PURGE (CV38 ONLY) DURING ENTRY (MANUAL SEQUENCE). OFF NOMINAL FLOW IS NECESSARY ONLY WHEN PNEUMATIC HELIUM IS SUPPLIED TO SUPPLEMENT ENGINE HELIUM PURGE REQUIREMENTS VIA INLET INTERCONNECT VALVE.

REFERENCES: RI MAIN PROPULSION SYSTEM SCHEMATICS, VS70-415001, 006, 007 & 008. BOOSTER SYS'S. BRIEFS, JSC-19401, 1-OCT.1984; RI SPEC DWG FOR ME284-0472 PARTS.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/24/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	3190	ABORT:	3/3

ITEM: MAIN ENGINE GN2 PURGE DISCONNECT (ORB HALF) (PD14)
FAILURE MODE: FAILS TO CLOSE OR REMAIN CLOSED

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) GN2 SUPPLY
- 2) INLET ENGINE GN2 PURGE SUPPLY FROM GSE
- 3) ORBITER HALF DISCONNECT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: LEFT T-0 UMBILICAL PANEL
PART NUMBER: MC276-0003-0017 (OV103); -0007 (099,102,104)

CAUSES: POPPET SEAT FAILURE; CONTAMINATION; SPRING BREAKAGE

EFFECTS/RATIONALE:
NO EFFECT. GN2 PURGE CEASES PRIOR TO L/OFF.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: MPS
MDAC ID: 3200

HIGHEST CRITICALITY	HDW/FUNC
FLIGHT:	2/2
ABORT:	1/1

ITEM: FACILITY PORTS
FAILURE MODE: GROSS LEAKAGE

LEAD ANALYST: M.L.MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) HELIUM SYSTEM
- 2) ENGINE 1,2,3 HELIUM REG PANELS A;B
- 3) FACILITY PORTS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: UNKNOWN

CAUSES: SEAL FAILURE

EFFECTS/RATIONALE:

EFFECTS/RATIONALE:
LEAKAGE FROM ANY PANEL FACILITY PORT, WHETHER THE HIGH PRESSURE
SIDE OR LOW PRESSURE SIDE MAY DEplete AN ENGINE HELIUM SUPPLY.

REFERENCES: RI MPS SCHEMATICS, VS70-41500X

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/16/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4011 ABORT: 3/3

ITEM: PNEU VALVE HE SUPPLY CHECK VALVE (CV4)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HELIUM SUPPLY CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
PNEUMATIC HELIUM WILL NOT BE USABLE FOR LAUNCH-LAUNCH DELAY OR
MISSION SCRUB. LOSS OF ALL FUNCTIONAL REDUNDANCY WILL RESULT IN
INABILITY TO LOAD PNEUMATIC HELIUM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/1R
MDAC ID: 4020 ABORT: 3/1R

ITEM: PNEU VALVE HE REG OUTLET CHECK VALVE (CV8)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HE REG OUTLET CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/1R
LIFTOFF:	3/1R	TAL: 3/1R
ONORBIT:	3/3	AOA: 3/1R
DEORBIT:	3/1R	ATO: 3/1R
LANDING/SAFING:	3/1R	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0024

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF ALL FUNCTIONAL REDUNDANCY WILL RESULT IN LOSS OF HELIUM
OVERBOARD. LOSS OF LIFE/VEHICLE DUE TO LOSS OF MPS VALVE
ACTUATION CAPABILITY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4021 ABORT: 2/1R

ITEM: PNEU VALVE HE ISOLATION CHECK VALVE (CV8)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HE REG OUTLET CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0013

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE BECAUSE PNEUMATIC HELIUM WILL NOT BE
AVAILABLE FOR MPS VALVE ACTUATION AND AFT COMPARTMENT PURGE.
LOSS OF ALL FUNCTIONAL REDUNDANCY WILL RESULT IN LOSS OF CHECK
VALVE FUNCTION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4030 ABORT: 2/1R

ITEM: PNEU VALVE HE ISOLATION CHECK VALVE (CV9)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0013

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE BECAUSE PNEUMATIC HELIUM WILL NOT BE
AVAILABLE FOR MPS DUMP VALVE ACTUATION AND AFT COMPARTMENT PURGE.
LOSS OF ALL FUNCTIONAL REDUNDANCY WILL RESULT IN LOSS OF CHECK
VALVE FUNCTION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 4031 ABORT: 3/2R

ITEM: PNEU VALVE HE ISOLATION CHECK VALVE (CV9)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN OPEN, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HE ISOLATION CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/3	AOA:	3/2R
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0013

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF ALL FUNCTIONAL REDUNDANCY WILL RESULT IN LOSS OF CHECK
VALVE FUNCTION. LOSS OF MISSION DUE TO LOSS OF MPS VALVE
ACTUATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4040 ABORT: 3/3

ITEM: GO2 PRESS MANIF REPRESS CHECK VALVE (CV10)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO

SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GO2 PRESS MANIF. REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CHECK BACKFLOW DURING MPS GO2 MANIFOLD
DUMP. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/10/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4041 ABORT: 3/3

ITEM: GO2 PRESS MANIF REPRESS CHECK VALVE (CV10)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GO2 PRESS MANIF. REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
HELIUM WILL NOT BE FED INTO THE GO2 PRESSURE MANIFOLD FOR DUMP
AND REPRESS. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4050 ABORT: 3/3

ITEM: LO2 FEED MANIF REPRESS CHECK VALVE (CV12)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED MANIF REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	/NA	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	/NA	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0013

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO CHECK BACKFLOW DURING MPS LO2 MANIFOLD
DUMP. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	1/1
MDAC ID:	4051	ABORT:	1/1

ITEM: LO2 FEED MANIF REPRESS CHECK VALVE (CV12)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED MANIF REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	/NA	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0013

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF MPS LO2 MANIFOLD DUMP
CAPABILITY. LOSS OF FLIGHT CONTROL DUE TO EXCESSIVE AFT CG.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/12/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	4060	ABORT:	3/3

ITEM: GH2 PRESS MANIF REPRESS CHECK VALVE (CV13)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO

SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GH2 PRESS MANIF REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CHECK BACKFLOW DURING MPS GH2 MANIFOLD DUMP. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4061 ABORT: 3/3

ITEM: GH2 PRESS MANIF REPRESS CHECK VALVE (CV13)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GH2 PRESS MANIF REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AND REPRESS GH2 MANIFOLD. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4070 ABORT: 3/3

ITEM: LH2 RECIRC MANIF REPRESS CHECK VALVE (CV14)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC MANIF REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	/NA	RTLS:		3/3
LIFTOFF:	3/3	TAL:		3/3
ONORBIT:	/NA	AOA:		3/3
DEORBIT:	3/3	ATO:		3/3
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CHECK BACKFLOW DURING MPS LH2 RECIRC
MANIFOLD DUMP. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4071 ABORT: 3/3

ITEM: LH2 RECIRC MANIF REPRESS CHECK VALVE (CV14)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC MANIF REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AND REPRESS THE MPS LH2 RECIRC
MANIFOLD. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4080 ABORT: 3/3

ITEM: LH2 FEED MANIF NOM REPRESS CHECK VALVE (CV15)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIF NOM REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0024

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CHECK BACKFLOW DURING MPS LH2 FEED MANIFOLD
DUMP. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/12/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4081 ABORT: 3/3

ITEM: LH2 FEED MANIF NOM REPRESS CHECK VALVE (CV15)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIF NOM REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0024

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AND REPRESS THE MPS LH2 FEED MANIFOLD.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: MPS
MDAC ID: 4090

HIGHEST CRITICALITY
FLIGHT: 2/1R
ABORT: 2/1R

HDW/FUNC

ITEM: LO2 TANK PRE-PRESS CHECK VALVE (CV16)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 TANK PRE-PRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	/NA	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF ULLAGE PRESSURE RESULTS IN ALL THREE MAIN ENGINES SHUTDOWN AND LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4091 ABORT: 3/3

ITEM: LO2 TANK PRE-PRESS CHECK VALVE (CV16)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 TANK PRE-PRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: /NA
LIFTOFF:	/NA	TAL: /NA
ONORBIT:	/NA	AOA: /NA
DEORBIT:	/NA	ATO: /NA
LANDING/SAFING:	/NA	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO HELIUM PREPRESS PRELAUNCH. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4100 ABORT: 2/1R

ITEM: LH2 TANK PRE-PRESS CHECK VALVE (CV17)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 TANK PRE-PRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	2/1R
LIFTOFF:	2/1R		TAL:	2/1R
ONORBIT:	/NA		AOA:	2/1R
DEORBIT:	/NA		ATO:	2/1R
LANDING/SAFING:	/NA			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF ULLAGE PRESSURE RESULTS IN ALL THREE MAIN ENGINE SHUTDOWN
AND LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4101 ABORT: 3/3

ITEM: LH2 TANK PRE-PRESS CHECK VALVE (DV17)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 TANK PRE-PRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0005

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO HELIUM PREPRESS PRELAUNCH. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86
SUBSYSTEM: MPS
MDAC ID: 4110

HIGHEST CRITICALITY
FLIGHT: 3/3
ABORT: 3/3

HDW/FUNC
3/3
3/3

ITEM: GH2 PRESS MANIFOLD REPRESS CHECK VALVE (CV24)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GH2 PRESS MANIFOLD REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO CHECK BACKFLOW DURING MPS GH2 PRESS
MANIFOLD DUMP AND REPRESS. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/13/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4111 ABORT: 3/3

ITEM: GH2 PRESS MANIFOLD REPRESS CHECK VALVE (CV24)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GH2 PRESS MANIFOLD REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AND REPRESS GH2 PRESS MANIFOLD.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4120 ABORT: 3/3

ITEM: LH2 FEED MANIF RTLS REPRESS CHECK VALVE (CV30)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIF RTLS REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0024

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO CHECK BACKFLOW DURING MPS LH2 FEED MANIFOLD
DUMP & REPRESS. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/14/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4121 ABORT: 3/3

ITEM: LH2 FEED MANIF RTLS REPRESS CHECK VALVE (CV30)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIF RTLS REPRESS CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0472-0024

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AND REPRESS LH2 RTLS MANIFOLD. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4130 ABORT: 3/3

ITEM: PNEU VALVE HE SUPPLY-ISOLATION VALVE (LV7,LV8)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY-ISOLATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0403-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO USE PNEUMATIC HELIUM FOR MPS VALVE
ACTUATION. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4131 ABORT: 3/3

ITEM: PNEU VALVE HE SUPPLY-ISOLATION VALVE (LV7,LV8)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY-ISOLATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0403-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO USE PNEUMATIC HELIUM FOR MPS VALVE
ACTUATION. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4132 ABORT: 3/3

ITEM: PNEU VALVE HE SUPPLY-ISOLATION VALVE (LV7,LV8)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY-ISOLATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0403-0011

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO USE PNEUMATIC HELIUM FOR MPS DUMP AND
PURGE. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4140 ABORT: 2/1R

ITEM: PNEU HE CROSSOVER SOLENOID (LV10)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU HE CROSSOVER SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF MPS HELIUM AFT COMPARTMENT
PURGE RESULTING IN LH2 AND LO2 MIXING WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4141 ABORT: 2/1R

ITEM: PNEU HE CROSSOVER SOLENOID (LV10)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU HE CROSSOVER SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LOSS OF MPS AFT COMPARTMENT PURGE
RESULTING IN LO2 AND LH2 MIXING WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4142 ABORT: 3/3

ITEM: PNEU HE CROSSOVER SOLENOID (LV10)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU HE CROSSOVER SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO ISOLATE THE HELIUM CROSSOVER. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4150 ABORT: 3/3

ITEM: LO2 PREVALVE OPENING SOLENOID (LV12,LV14,LV16)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO OPEN THE SOLENOID VALVE. SYSTEM
DEGRADATION. LO2 PREVALVE REMAINS OPEN WITHOUT HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4151 ABORT: 3/3

ITEM: LO2 PREVALVE OPENING SOLENOID (LV12,LV14,LV16)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE SOLENOID VALVE OPEN. SYSTEM
DEGRADATION. LO2 PREVALVE REMAINS OPEN WITHOUT HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4152 ABORT: 2/1R

ITEM: LO2 PREVALVE OPENING SOLENOID (LV12,LV14,LV16)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 2/1R
LIFTOFF:	2/1R	TAL: 2/1R
ONORBIT:	3/3	AOA: 2/1R
DEORBIT:	3/3	ATO: 2/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 PREVALVE TO CLOSE AT
MECO RESULTING IN SSME PUMP OVERSPEED AND EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4160 ABORT: 2/1R

ITEM: LO2 PREVALVE OPENING SOLENOID (LV13, LV15, LV17)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 PREVALVE TO CLOSE AT
MECO RESULTING IN SSME PUMP OVERSPEED AND EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4161 ABORT: 2/1R

ITEM: LO2 PREVALVE CLOSING SOLENOID (LV13, LV15, LV17)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	2/1R
LIFTOFF:	2/1R		TAL:	2/1R
ONORBIT:	3/3		AOA:	2/1R
DEORBIT:	3/3		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 PREVALVE TO CLOSE AT
MECO RESULTING IN SSME PUMP OVERSPEED AND EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4162 ABORT: 3/3

ITEM: LO2 PREVALVE CLOSING SOLENOID (LV13, LV15, LV17)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE SOLENOID CLOSED. SYSTEM
DEGRADATION. LO2 PREVALVE REMAINS CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/15/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4164 ABORT: 3/3

ITEM: LH2 PREVALVE OPENING SOLENOID (LV18, LV20, LV22)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM
- 3) PNEUMATIC HELIUM
- 4) LH2 PREVALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO OPEN THE SOLENOID VALVE. SYSTEM
DEGRADATION. LH2 PREVALVE REMAINS OPEN WITHOUT HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4165 ABORT: 3/3

ITEM: LH2 PREVALVE OPENING SOLENOID (LV18, LV20, LV22)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM
- 3) PNEUMATIC HELIUM
- 4) LH2 PREVALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE SOLENOID VALVE OPEN. SYSTEM
DEGRADATION. LH2 PREVALVE REMAINS OPEN WITHOUT HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4166 ABORT: 2/1R

ITEM: LH2 PREVALVE OPENING SOLENOID (LV18,LV20,LV22)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM
- 3) PNEUMATIC HELIUM
- 4) LH2 PREVALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LH2 PREVALVE TO CLOSE AT
MECO RESULTING IN MIXING OF LH2 WITH LO2 IN THE SSME WITH AN
EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4167 ABORT: 2/1R

ITEM: LH2 PREVALVE CLOSING SOLENOID (LV19, LV21, LV23)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM
- 3) PNEUMATIC HELIUM
- 4) LH2 PREVALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LH2 PREVALVE TO CLOSE
RESULTING IN LH2 MIXING WITH LO2 WITH AN SSME EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4168 ABORT: 2/1R

ITEM: LH2 PREVALVE CLOSING SOLENOID (LV19,LV21,LV23)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM
- 3) PNEUMATIC HELIUM
- 4) LH2 PREVALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LH2 PREVALVE TO CLOSE AT
MECO RESULTING IN LH2 MIXING WITH LO2 WITH AN SSME EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4169 ABORT: 3/3

ITEM: LH2 PREVALVE CLOSING SOLENOID (LV19, LV21, LV23)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM
- 3) PNEUMATIC HELIUM
- 4) LH2 PREVALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE SOLENOID. SYSTEM DEGRADATION.
LH2 PREVALVE REMAINS CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4170 ABORT: 2/1R

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
(LV24)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF LO2 FEEDLINE MANIFOLD
PRESSURE RELIEF WITH LO2 MANIFOLD RUPTURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4171 ABORT: 2/1R

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
(LV24)

FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF LO2 FEEDLINE MANIFOLD
PRESSURE RELIEF WITH LO2 MANIFOLD RUPTURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4172 ABORT: 2/1R

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
(LV24)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO EXTERNAL LEAKAGE OF LO2 OVERBOARD
DURING LAUNCH, DUE TO LOSS OF ALL FUNCTIONAL REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4180 ABORT: 2/1R

ITEM: LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
(LV25)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF LH2 FEEDLINE MANIFOLD
PRESSURE RELIEF WITH LH2 MANIFOLD RUPTURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4181 ABORT: 2/1R

ITEM: LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
(LV25)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 2/1R
LIFTOFF:	2/1R	TAL: 2/1R
ONORBIT:	2/1R	AOA: 2/1R
DEORBIT:	2/1R	ATO: 2/1R
LANDING/SAFING:	2/1R	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LOSS OF LH2 FEEDLINE MANIFOLD
PRESSURE RELIEF WITH LH2 MANIFOLD PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4182 ABORT: 2/1R

ITEM: LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
(LV25)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	HDW/FUNC
PRELAUNCH:	3/3	ABORT	
LIFTOFF:	2/1R	RTLS:	2/1R
ONORBIT:	3/3	TAL:	2/1R
DEORBIT:	3/3	AOA:	2/1R
LANDING/SAFING:	3/3	ATO:	2/1R

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO EXTERNAL LEAKAGE OF LH2 OVERBOARD
DURING LAUNCH, DUE TO LOSS OF ALL FUNCTIONAL REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/01/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	4190	ABORT:	2/1R

ITEM: HE SUPPLY BLOWDOWN VALVE (LV26,LV27)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) HE SUPPLY BLOWDOWN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF AFT COMPARTMENT PURGE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4191 ABORT: 2/1R

ITEM: HE SUPPLY BLOWDOWN VALVE (LV26,LV27)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) HE SUPPLY BLOWDOWN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF AFT COMPARTMENT PURGE
RESULTING IN LO2 AND LH2 MIXING WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/01/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4192 ABORT: 2/1R

ITEM: HE SUPPLY BLOWDOWN VALVE (LV26, LV27)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) HE SUPPLY BLOWDOWN VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: ME284-0404-0002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LOSS OF HELIUM FOR MPS LO2 DUMP.
LOSS OF MPS LO2 DUMP RESULTS IN LOSS OF FLIGHT CONTROL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4200 ABORT: 3/3

ITEM: LO2 OUTBOARD FILL VALVE OPENING SOLENOID (LV28)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	HDW/FUNC
PRELAUNCH:	3/3	ABORT	
LIFTOFF:	3/3	RTLS:	3/3
ONORBIT:	3/3	TAL:	3/3
DEORBIT:	3/3	AOA:	3/3
LANDING/SAFING:	3/3	ATO:	3/3

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LO2 OUTBOARD FILL VALVE SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4201 ABORT: 3/3

ITEM: LO2 OUTBOARD FILL VALVE OPENING SOLENOID (LV28)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LO2 FILL VALVE SOLENOID OPEN.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4202 ABORT: 2/1R

ITEM: LO2 OUTBOARD FILL VALVE OPENING SOLENOID (LV28)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF LO2 OVERBOARD RESULTING IN
EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4210 ABORT: 3/3

ITEM: LO2 OUTBOARD FILL VALVE CLOSING SOLENOID (LV29)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO OPEN THE LO2 FILL VALVE CLOSING SOLENOID.
SYSTEM DEGRADATION. FILL VALVE REMAINS CLOSED WITH NO HELIUM
PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4211 ABORT: 3/3

ITEM: LO2 OUTBOARD FILL VALVE CLOSING SOLENOID (LV29)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LO2 FILL VALVE CLOSING SOLENOID
OPEN. SYSTEM DEGRADATION. FILL VALVE REMAINS CLOSED WITH NO
HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4212 ABORT: 3/3

ITEM: LO2 OUTBOARD FILL VALVE CLOSING SOLENOID (LV29)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LO2 FILL VALVE CLOSING SOLENOID
CLOSED. SYSTEM DEGRADATION. FILL VALVE WILL REMAIN CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4220 ABORT: 3/3

ITEM: LO2 INBOARD FILL VALVE OPENING SOLENOID (LV30)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 INBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LO2 FILL VALVE OPENING SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4221 ABORT: 3/3

ITEM: LO2 INBOARD FILL VALVE OPENING SOLENOID (LV30)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 INBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LO2 FILL VALVE OPENING SOLENOID
OPEN. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4222 ABORT: 2/1R

ITEM: LO2 INBOARD FILL VALVE OPENING SOLENOID (LV30)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 INBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LO2 FILL VALVE OPENING AND LO2
EXTERNAL LEAKAGE WITH LOSS OF ALL FUNCTIONAL REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4223 ABORT: 3/3

ITEM: LO2 INBOARD FILL VALVE CLOSING SOLENOID (LV31)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 INBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LO2 FILL VALVE CLOSING SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4224 ABORT: 2/1R

ITEM: LO2 INBOARD FILL VALVE CLOSING SOLENOID (LV31)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 INBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LO2 FILL VALVE OPENING AND LO2
EXTERNAL LEAKAGE WITH LOSS OF ALL FUNCTIONAL REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4225 ABORT: 3/3

ITEM: LO2 INBOARD FILL VALVE CLOSING SOLENOID (LV31)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 INBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE LO2 FILL VALVE CLOSING SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4226 ABORT: 3/3

ITEM: LH2 OUTBOARD FILL VALVE OPENING SOLENOID (LV32)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN LH2 OUTBOARD FILL VALVE SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4227 ABORT: 3/3

ITEM: LH2 OUTBOARD FILL VALVE OPENING SOLENOID (LV32)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LH2 FILL VALVE SOLENOID OPEN.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4228 ABORT: 2/1R

ITEM: LH2 OUTBOARD FILL VALVE OPENING SOLENOID (LV32)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 OUTBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF LH2 OVERBOARD RESULTING IN
EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4229 ABORT: 3/3

ITEM: LH2 OUTBOARD FILL VALVE CLOSING SOLENOID (LV33)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 OUTBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO CLOSE THE LH2 FILL VALVE SOLENOID. SYSTEM
DEGRADATION. FILL VALVE REMAINS CLOSED WITH NO HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4230 ABORT: 3/3

ITEM: LH2 OUTBOARD FILL VALVE CLOSING SOLENOID (LV33)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 OUTBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LH2 FILL VALVE CLOSING SOLENOID
OPEN. SYSTEM DEGRADATION. FILL VALVE REMAINS CLOSED WITH NO
HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/02/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4231 ABORT: 3/3

ITEM: LH2 OUTBOARD FILL VALVE CLOSING SOLENOID (LV33)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 OUTBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LH2 FILL VALVE CLOSING SOLENOID
CLOSED. SYSTEM DEGRADATION. FILL VALVE WILL REMAIN CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4232 ABORT: 3/3

ITEM: LH2 INBOARD FILL VALVE OPENING SOLENOID (LV34)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 INBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 FILL VALVE OPENING SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

DATE:	12/03/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	4233	ABORT:	3/3

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 INBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

REFERENCES:

DATE:	12/03/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	4234	ABORT:	2/1R

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 INBOARD FILL VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LH2 FILL VALVE OPENING AND LH2
EXTERNAL LEAKAGE WITH LOSS OF ALL FUNCTIONAL REDUNDANCY.

REPORT DATE 01/16/87

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4235 ABORT: 3/3

ITEM: LH2 INBOARD FILL VALVE CLOSING SOLENOID (LV35)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 INBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 FILL VALVE CLOSING SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4236 ABORT: 2/1R

ITEM: LH2 INBOARD FILL VALVE CLOSING SOLENOID (LV35)
FAILURE MODE: FAILS TO REMAIN OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 INBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LH2 FILL VALVE OPENING AND LH2
EXTERNAL LEAKAGE WITH LOSS OF ALL FUNCTIONAL REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4237 ABORT: 3/3

ITEM: LH2 INBOARD FILL VALVE CLOSING SOLENOID (LV35)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 INBOARD FILL VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	3/3	RTLS:		3/3
LIFTOFF:	3/3	TAL:		3/3
ONORBIT:	3/3	AOA:		3/3
DEORBIT:	3/3	ATO:		3/3
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE LH2 FILL VALVE CLOSING SOLENOID.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4240 ABORT: 3/3

ITEM: LH2 RECIRC PUMP VALVE OPENING SOLENOID (LV36)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC PUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	/NA	ATO:	3/3
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 RECIRC VALVES. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4241 ABORT: 3/3

ITEM: LH2 RECIRC PUMP VALVE OPENING SOLENOID (LV36)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC PUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	/NA	ATO:	3/3
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP OPEN THE LH2 RECIRC VALVES. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4242 ABORT: 3/3

ITEM: LH2 RECIRC PUMP VALVE OPENING SOLENOID (LV36)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC PUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	/NA	ATO:	3/3
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE LH2 RECIRC VALVES. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4250 ABORT: 3/3

ITEM: LH2 REPLENISH VALVE OPENING SOLENOID(LV39)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 REPLENISH VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 REPLENISH VALVE. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4251 ABORT: 3/3

ITEM: LH2 REPLENISH VALVE OPENING SOLENOID(LV39)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 REPLENISH VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP OPEN THE LH2 REPLENISH VALVE. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4252 ABORT: 2/1R

ITEM: LH2 REPLENISH VALVE OPENING SOLENOID(LV39)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 REPLENISH VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE TO CLOSE THE LH2 REPLENISH
VALVE RESULTING IN LH2 LEAK OVERBOARD WITH EXPLOSION AND LOSS OF
ALL FUNCTIONAL REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4260 ABORT: 2/1R

ITEM: LO2 MANIFOLD REPRESS VALVE (LV40,LV41)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 MANIFOLD REPRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF LO2 MPS DUMP RESULTING IN
LOSS OF FLIGHT CONTROL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4261 ABORT: 2/1R

ITEM: LO2 MANIFOLD REPRESS VALVE (LV40,LV41)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 MANIFOLD REPRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LOSS OF MPS LO2 DUMP RESULTING IN
LOSS OF FLIGHT CONTROL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/2R
MDAC ID: 4262 ABORT: 3/2R

ITEM: LO2 MANIFOLD REPRESS VALVE (LV40, LV41)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 MANIFOLD REPRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/2R
LIFTOFF:	3/2R	TAL:	3/2R
ONORBIT:	3/3	AOA:	3/2R
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LO2 REPRESS VALVE CLOSED RESULTING
IN SSME SHUTDOWN AND LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4270 ABORT: 3/3

ITEM: LH2 MANIFOLD REPRESS VALVE (LV42,LV43)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 MANIFOLD REPRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	3/3	RTLS:		3/3
LIFTOFF:	3/3	TAL:		3/3
ONORBIT:	3/3	AOA:		3/3
DEORBIT:	3/3	ATO:		3/3
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 REPRESS VALVE. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4271 ABORT: 3/3

ITEM: LH2 MANIFOLD REPRESS VALVE (LV42,LV43)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 MANIFOLD REPRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LH2 REPRESS VALVE OPEN. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/1R
MDAC ID: 4272 ABORT: 3/1R

ITEM: LH2 MANIFOLD REPRESS VALVE (LV42,LV43)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 MANIFOLD REPRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0003

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LH2 REPRESS VALVE CLOSED RESULTING
IN HELIUM INGESTION INTO ALL THREE MAIN ENGINES WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4280 ABORT: 3/3

ITEM: LO2 FEED DISCONNECT VALVE OPENING SOLENOID (LV46)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LO2 FEED DISCONNECT VALVE
PRELAUNCH. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4281 ABORT: 2/1R

ITEM: LO2 FEED DISCONNECT VALVE OPENING SOLENOID (LV46)
FAILURE MODE: FAILS TO REMAIN OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 FEED DISCONNECT
OPENING SOLENOID TO REMAIN OPEN AND LOSS OF ALL FUNCTIONAL
REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4282 ABORT: 3/3

ITEM: LO2 FEED DISCONNECT VALVE OPENING SOLENOID (LV46)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE LO2 FEED DISCONNECT VALVE.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4290 ABORT: 3/3

ITEM: LO2 FEED DISCONNECT VALVE CLOSING SOLENOID (LV47)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO OPEN THE LO2 FEED DISCONNECT VALVE CLOSING
SOLENOID. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4291 ABORT: 3/3

ITEM: LO2 FEED DISCONNECT VALVE CLOSING SOLENOID (LV47)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LO2 FEED DISCONNECT VALVE CLOSING
SOLENOID OPEN. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4292 ABORT: 3/3

ITEM: LO2 FEED DISCONNECT VALVE CLOSING SOLENOID (LV47)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 FEED DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LO2 FEED DISCONNECT VALVE CLOSING
SOLENOID CLOSED. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4300 ABORT: 3/3

ITEM: LH2 FEED DISCONNECT VALVE OPENING SOLENOID (LV48)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 FEED DISCONNECT VALVE. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4301 ABORT: 2/1R

ITEM: LH2 FEED DISCONNECT VALVE OPENING SOLENOID (LV48)
FAILURE MODE: FAILS TO REMAIN OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LH2 FEED DISCONNECT
OPENING SOLENOID TO REMAIN OPEN AND LOSS OF ALL FUNCTIONAL
REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4302 ABORT: 3/3

ITEM: LH2 FEED DISCONNECT VALVE OPENING SOLENOID (LV48)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE LH2 FEED DISCONNECT VALVE.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86
SUBSYSTEM: MPS
MDAC ID: 4310

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: LH2 FEED DISCONNECT VALVE CLOSING SOLENOID (LV49)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO
SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO OPEN THE LH2 FEED DISCONNECT VALVE CLOSING SOLENOID. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4311 ABORT: 3/3

ITEM: LH2 FEED DISCONNECT VALVE CLOSING SOLENOID (LV49)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LH2 FEED DISCONNECT VALVE CLOSING
SOLENOID OPEN. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/09/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	4312	ABORT:	3/3

ITEM: LH2 FEED DISCONNECT VALVE CLOSING SOLENOID (LV49)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LH2 FEED DISCONNECT VALVE CLOSING SOLENOID CLOSED. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/09/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4320 ABORT: 3/3

ITEM: LH2 RECIRC DISCONNECT VALVE OPENING SOLENOID
(LV50)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 RECIRC DISCONNECT VALVE.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4321 ABORT: 3/3

ITEM: LH2 RECIRC DISCONNECT VALVE OPENING SOLENOID
(LV50)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LH2 RECIRC DISCONNECT VALVE
OPENING SOLENOID OPEN. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 4322 ABORT: 1/1

ITEM: LH2 RECIRC DISCONNECT VALVE OPENING SOLENOID
(LV50)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC DISCONNECT VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LH2 RECIRC DISCONNECT
VALVE OPENING SOLENOID TO CLOSE RESULTING IN LH2 LEAK OVERBOARD
WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 4330 ABORT: 1/1

ITEM: LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID
(LV51)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LH2 RECIRC DISCONNECT
VALVE CLOSING SOLENOID TO OPEN RESULTING IN LH2 LEAK OVERBOARD
WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 4331 ABORT: 1/1

ITEM: LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID
(LV51)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO FAILURE TO KEEP LH2 RECIRC DISCONNECT
VALVE CLOSING SOLENOID OPEN RESULTING IN LH2 LEAK OVERBOARD WITH
EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4332 ABORT: 3/3

ITEM: LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID
(LV51)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE LH2 RECIRC DISCONNECT VALVE
CLOSING SOLENOID CLOSED. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4340 ABORT: 1/1

ITEM: LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID
(LV72)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LH2 RTLS FEEDLINE DUMP FAILURE AND
LH2 LEAKAGE OVERBOARD THROUGH FEEDLINE RELIEF WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4341 ABORT: 1/1

ITEM: LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID
(LV72)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LH2 RTLS FEEDLINE DUMP FAILURE AND
LH2 LEAKAGE OVERBOARD THROUGH FEEDLINE RELIEF WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/03/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4342 ABORT: 2/1R

ITEM: LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID
(LV72)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LH2 RTLS FEEDLINE DUMP VALVES FAIL
OPEN AND LH2 LEAKAGE OVERBOARD WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4350 ABORT: 1/1

ITEM: LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID
(LV73)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LH2 RTLS FEEDLINE DUMP FAILURE AND
LH2 LEAKAGE OVERBOARD THROUGH FEEDLINE RELIEF WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4351 ABORT: 1/1

ITEM: LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID
(LV73)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LH2 RTLS FEEDLINE DUMP FAILURE AND
LH2 LEAKAGE OVERBOARD THROUGH FEEDLINE RELIEF WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4352 ABORT: 2/1R

ITEM: LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID
(LV73)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LH2 RTLS FEEDLINE DUMP VALVES FAIL
OPEN AND LH2 LEAKAGE OVERBOARD WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4360 ABORT: 3/3

ITEM: LH2 FEED MANIFOLD RTLS PRESS VALVE (LV74,LV75)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIFOLD RTLS PRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE LH2 FEED MANIFOLD RTLS PRESS
VALVE. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4361 ABORT: 3/3

ITEM: LH2 FEED MANIFOLD RTLS PRESS VALVE (LV74,LV75)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIFOLD RTLS PRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO KEEP THE LH2 FEED MANIFOLD RTLS PRESS VALVE
SOLENOID OPEN. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/04/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	2/1R
MDAC ID:	4362	ABORT:	2/1R

ITEM: LH2 FEED MANIFOLD RTLS PRESS VALVE (LV74,LV75)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIFOLD RTLS PRESS VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0403-0002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO HELIUM INGESTION INTO ALL THREE MAIN
ENGINES RESULTING IN EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4370 ABORT: 2/1R

ITEM: LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	3/3	RTLS:		2/1R
LIFTOFF:	2/1R	TAL:		2/1R
ONORBIT:	3/3	AOA:		2/1R
DEORBIT:	3/3	ATO:		2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LO2 OVERBOARD BLEED VALVE OPENING
RESULTING IN LO2 LEAKAGE OVERBOARD WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4371 ABORT: 2/1R

ITEM: LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO LO2 OVERBOARD BLEED VALVE OPENING
RESULTING IN LO2 LEAKAGE OVERBOARD WITH EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4372 ABORT: 3/3

ITEM: LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO CLOSE THE LO2 OVERBOARD BLEED VALVE CLOSING
SOLENOID. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4380 ABORT: 3/3

ITEM: LO2 POGO ACCUM RECIRC VALVE CLOSING SOLENOID
(LV77, LV78)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 POGO ACCUM RECIRC VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE LO2 POGO ACCUM RECIRC VALVE.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4381 ABORT: 3/3

ITEM: LO2 POGO ACCUM RECIRC VALVE CLOSING SOLENOID
(LV77, LV78)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 POGO ACCUM RECIRC VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE LO2 POGO ACCUM RECIRC VALVE.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4382 ABORT: 2/1R

ITEM: LO2 POGO ACCUM RECIRC VALVE CLOSING SOLENOID
(LV77, LV78)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 POGO ACCUM RECIRC VALVE CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 POGO SUPPRESSION
RESULTING IN VEHICLE STRUCTURAL DAMAGE AND LOSS OF FLIGHT
CONTROL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4390 ABORT: 3/3

ITEM: LH2 HI POINT BLEED VALVE OPENING SOLENOID (LV79)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 HI POINT BLEED VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO OPEN THE LH2 HI POINT BLEED VALVE OPENING
SOLENOID. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4391 ABORT: 3/3

ITEM: LH2 HI POINT BLEED VALVE OPENING SOLENOID (LV79)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 HI POINT BLEED VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP OPEN THE LH2 HI POINT BLEED VALVE
OPENING SOLENOID. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4392 ABORT: 2/1R

ITEM: LH2 HI POINT BLEED VALVE OPENING SOLENOID (LV79)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 HI POINT BLEED VALVE OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0012

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE TO CLOSE THE LH2 HI POINT
BLEED VALVE OPENING SOLENOID RESULTING IN LH2 LEAK OVERBOARD WITH
LOSS OF ALL FUNCTIONAL REDUNDANCY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4400 ABORT: 2/1R

ITEM: LO2 PREVALVE REDUNDANT CLOSING SOLENOID
(LV80, LV81, LV82)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE REDUNDANT CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 PREVALVE TO CLOSE AT MECO RESULTING IN SSME PUMP OVERSPEED AND EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4401 ABORT: 2/1R

ITEM: LO2 PREVALVE REDUNDANT CLOSING SOLENOID
(LV80, LV81, LV82)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE REDUNDANT CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 PREVALVE TO CLOSE AT
MECO RESULTING IN SSME PUMP OVERSPEED AND EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4402 ABORT: 3/3

ITEM: LO2 PREVALVE REDUNDANT CLOSING SOLENOID
(LV80, LV81, LV82)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE REDUNDANT CLOSING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO KEEP THE SOLENOID CLOSED. SYSTEM
DEGRADATION. LO2 PREVALVE REMAINS CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4410 ABORT: 3/3

ITEM: LO2 PREVALVE REDUNDANT OPENING SOLENOID
(LV83, LV84, LV85)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE REDUNDANT OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE SOLENOID VALVE. SYSTEM
DEGRADATION. LO2 PREVALVE REMAINS OPEN WITHOUT HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4411 ABORT: 3/3

ITEM: LO2 PREVALVE REDUNDANT OPENING SOLENOID
(LV83, LV84, LV85)
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE REDUNDANT OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO OPEN THE SOLENOID VALVE. SYSTEM
DEGRADATION. LO2 PREVALVE REMAINS OPEN WITHOUT HELIUM PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4412 ABORT: 2/1R

ITEM: LO2 PREVALVE REDUNDANT OPENING SOLENOID
(LV83, LV84, LV85)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE REDUNDANT OPENING SOLENOID
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0404-0021

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE DUE TO FAILURE OF LO2 PREVALVE TO CLOSE AT
MECO. RESULTING IN SSME PUMP OVERSPEED AND EXPLOSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4420 ABORT: 2/1R

ITEM: LO2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF)
(PD9)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 TANK GND PRE-PASS (ORB/GND) DISC (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	/NA	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LO2 ULLAGE PRESSURE RESULTS IN ALL THREE MAIN ENGINES
SHUTDOWN AND LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4421 ABORT: 3/3

ITEM: LO2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF)
(PD9)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 TANK GND PRE-PASS (ORB/GND) DISC (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO HELIUM PREPRESS DURING PRELAUNCH. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4422 ABORT: 2/1R

ITEM: LO2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF)
(PD9)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 TANK GND PRE-PASS (ORB/GND) DISC (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	/NA	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LO2 ULLAGE PRESSURE RESULTS IN ALL THREE MAIN ENGINES
SHUTDOWN AND LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4430 ABORT: 2/1R

ITEM: LH2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF)
(PD10)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 TANK GND PRE-PRESS (ORB/GND) DISC (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	2/1R
LIFTOFF:	2/1R		TAL:	2/1R
ONORBIT:	/NA		AOA:	2/1R
DEORBIT:	/NA		ATO:	2/1R
LANDING/SAFING:	/NA			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LH2 ULLAGE PRESSURE RESULTS IN ALL THREE MAIN ENGINES
SHUTDOWN AND LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	4431	ABORT:	3/3

ITEM: LH2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF)
(PD10)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 TANK GND PRE-PRESS (ORB/GND) DISC (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO HELIUM PREPRESS DURING PRELAUNCH. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4432 ABORT: 2/1R

ITEM: LH2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF)
(PD10)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 TANK GND PRE-PRESS (ORB/GND) DISC (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	/NA	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LH2 ULLAGE RESULTS IN ALL THREE MAIN ENGINES SHUTDOWN AND
LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 4460 ABORT: 1/1

ITEM: TEST PORT, PNEU HE OUTLET (TP1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) TEST PORT, PNEU HE OUTLET
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415756-002

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LIFE/VEHICLE BECAUSE PNEUMATIC HELIUM WILL NOT BE
AVAILABLE FOR MPS DUMP VALVE ACTUATION AND AFT COMPARTMENT PURGE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4470 ABORT: 3/3

ITEM: TEST PORT, LH2 REPRESS REG OUTLET (TP3)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) TEST PORT, LH2 REPRESS REG OUTLET
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415532-001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AND REPRESS THE LH2 REPRESS MANIFOLD.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4480 ABORT: 3/3

ITEM: TEST PORT, LO2 REPRESS REG OUTLET (TP4)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) TEST PORT, LO2 REPRESS REG OUTLET
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415532-001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AN REPRESS THE LO2 REPRESS MANIFOLD.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4490 ABORT: 2/1R

ITEM: TEST PORT, LO2 PREPRESS DISC. CHECK VALVE (TP9)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) TEST PORT, LO2 PREPRESS DISC. CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	/NA	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415446-001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LO2 ULLAGE PRESSURE RESULTS IN ALL THREE MAIN ENGINES
SHUTDOWN AND LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4500 ABORT: 2/1R

ITEM: TEST PORT, LH2 PREPRESS DISC. CHECK VALVE (TP10)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) TEST PORT, LH2 PREPRESS DISC. CHECK VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	/NA	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415446-001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF LH2 ULLAGE PRESSURE RESULTS IN ALL THREE MAIN ENGINES
SHUTDOWN AND LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 4510 ABORT: 2/2

ITEM: TEST PORT, PNEU SUPPLY HELIUM (TP29)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) TEST PORT, PNEU SUPPLY HELIUM
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/2
LIFTOFF:	2/2	TAL:	2/2
ONORBIT:	3/3	AOA:	2/2
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415790-001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF MISSION DUE TO LOSS OF PNEUMATIC HELIUM FOR MPS VALVE
ACTUATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4520 ABORT: 3/3

ITEM: TEST PORT, CHECK VALVE CV24 LEAKAGE (TP36)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) TEST PORT, CHECK VALVE CV24 LEAKAGE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415133-001

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP AND REPRESS THE GH2 PRESS MANIFOLD.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4530 ABORT: 2/1R

ITEM: PNEU VALVE HE SUPPLY REGULATOR (PR4)
FAILURE MODE: RESTRICTED FLOW, FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY REGULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	/NA	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0399-004

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF LIFE/VEHICLE DUE TO LOSS OF ALL REDUNDANCY FOR MPS VALVE
ACTUATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4531 ABORT: 3/3

ITEM: PNEU VALVE HE SUPPLY REGULATOR (PR4)
FAILURE MODE: FAILS TO CLOSE, FAILS MID-TRAVEL

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY REGULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0399-004

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO REGULATE PNEUMATIC HELIUM FLOW FOR MPS
VALVE ACTUATION AND MPS DUMP AND REPRESS. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4540 ABORT: 2/1R

ITEM: LO2 MANIF REPRESS REGULATOR (PR5)
FAILURE MODE: RESTRICTED FLOW, FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 MANIF REPRESS REGULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0399-004

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP THE LO2 MANIFOLD RESULTS IN LOSS OF
LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4541 ABORT: 3/3

ITEM: LO2 MANIF REPRESS REGULATOR (PR5)
FAILURE MODE: FAILS TO CLOSE, FAILS MID-TRAVEL

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 MANIF REPRESS REGULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0399-004

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO REGULATE HELIUM PRESSURE DURING MPS LO2
MANIFOLD DUMP AND REPRESS. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4550 ABORT: 2/1R

ITEM: LH2 MANIF REPRESS REGULATOR (PR6)
FAILURE MODE: RESTRICTED FLOW, FAILS TO OPEN, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 MANIF REPRESS REGULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0399-004

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS LIFE/VEHICLE DUE TO FAILURE TO REPRESS THE LH2 MANIFOLD
RESULTING IN RUPTURE AND LH2 LEAK.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4551 ABORT: 3/3

ITEM: LH2 MANIF REPRESS REGULATOR (PR6)
FAILURE MODE: FAILS TO CLOSE, FAILS MID-TRAVEL

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 MANIF REPRESS REGULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0399-004

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO REGULATE HELIUM DURING LH2 MANIFOLD DUMP
AND REPRESS. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	4560	ABORT:	3/3

ITEM: PNEU VALVE HE SUPPLY RELIEF VALVE (RV4)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY RELIEF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	3/3	RTLS:		3/3
LIFTOFF:	3/3	TAL:		3/3
ONORBIT:	/NA	AOA:		3/3
DEORBIT:	3/3	ATO:		3/3
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0398-0005

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO REGULATE PNEUMATIC HELIUM FOR MPS VALVE
ACTUATION AND MPS DUMP AND REPRESS. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4561 ABORT: 3/3

ITEM: PNEU VALVE HE SUPPLY RELIEF VALVE (RV4)
FAILURE MODE: FAILS TO CLOSE, EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY RELIEF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC284-0398-0005

CAUSES: VIBRATION, CONTAMINATION, OR PIECE-PART STRUCTURAL
FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO USE PNEUMATIC HELIUM FOR MPS VALVE
ACTUATION. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/2
MDAC ID: 4570 ABORT: 2/2

ITEM: PNEU VALVE HE SUPPLY TANK (TK4)
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU VALVE HE SUPPLY TANK
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/2
LIFTOFF:	2/2	TAL:	2/2
ONORBIT:	/NA	AOA:	2/2
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC282-0082-0010

CAUSES: VIBRATION OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF PNEUMATIC HELIUM FOR MPS VALVE ACTUATOR AND MPS DUMP AND REPRESS. LOSS OF CAPABILITY TO FEED PNEUMATIC HELIUM TO AN ENGINE HELIUM SYSTEM WILL RESULT IN LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4580 ABORT: 2/1R

ITEM: LO2 PREVALVE PNEU ACCUMULATOR (AU5)
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LO2 PREVALVE PNEU ACCUMULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC282-0070-0001

CAUSES: VIBRATION OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP LO2 MANIFOLD RESULTS IN LOSS OF
LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 2/1R
MDAC ID: 4590 ABORT: 2/1R

ITEM: LH2 PREVALVE PNEU ACCUMULATOR (AU6)
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 PREVALVE PNEU ACCUMULATOR
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	/NA	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT FUSELAGE
PART NUMBER: MC282-0070-0001

CAUSES: VIBRATION OR PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP LO2 MANIFOLD RESULTS IN LOSS OF
LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	11/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	MPS	FLIGHT:	3/3
MDAC ID:	4600	ABORT:	3/3

ITEM: LH2 FEED MANIF RTLS REPRESS ORIFICE (RP9)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) LH2 FEED MANIF RTLS REPRESS ORIFICE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: VO70-415545-001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP LH2 RTLS MANIFOLD. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4610 ABORT: 3/3

ITEM: PNEU HE SUPPLY FILTER (FL5)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEU HE SUPPLY FILTER
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: ME286-0056-0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO USE PNEUMATIC HELIUM FOR MPS VALVE
ACTUATOR. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4620 ABORT: 3/3

ITEM: PNEUMATIC HE FILL LINE (.50",.375",.625" DIA)
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HELIUM FILL LINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER:

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO USE PNEUMATIC HELIUM FOR MPS VALVE
ACTUATION. SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 4630 ABORT: 1/1

ITEM: PNEUMATIC HE PRESSURE LINE (.50" DIA)
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HE PRESSURE LINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	/NA	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER:

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP LO2 MANIFOLD RESULTS IN LOSS OF
LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 4640 ABORT: 1/1

ITEM: PNEUMATIC HE PRESS VALVE ACTUATION LINE (.25",.38"
DIA)
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HE PRESS VALVE ACTUATION LINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	/NA	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER:

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP LO2 MANIFOLD RESULTS IN LOSS OF
LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 1/1
MDAC ID: 4650 ABORT: 1/1

ITEM: PNEUMATIC HELIUM INTERCONNECT LINE
(.63",1.00",.50" DIA)
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) PNEUMATIC HE INTERCONNECT LINE
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	/NA	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER:

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO DUMP THE LO2 MANIFOLD RESULTS IN LOSS OF
LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4660 ABORT: 3/3

ITEM: GN2 PURGE (ORB/GND) DISC. (ORB HALF) (PD14)
FAILURE MODE: FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL
LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GN2 PURGE (ORB/GND) DISC. (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE THE GN2 PURGE DISCONNECT VALVE.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4662 ABORT: 3/3

ITEM: GN2 PURGE (ORB/GND) DISC. (ORB HALF) (PD14)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GN2 PURGE (ORB/GND) DISC. (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

LOSS OF CAPABILITY TO PURGE THE SSME'S PRELAUNCH. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4664 ABORT: 3/3

ITEM: GN2 PURGE (ORB/GND) DISC. (ORB HALF) (PD14)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GN2 PURGE (ORB/GND) DISC. (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO PURGE SSME'S WITH NITROGEN PRELAUNCH.
SYSTEM DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/05/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: MPS FLIGHT: 3/3
MDAC ID: 4666 ABORT: 3/3

ITEM: GN2 PURGE (ORB/GND) DISC. (ORB HALF) (PD14)
FAILURE MODE: FAILS TO OPEN, EXTERNAL LEAKAGE, FAILS TO CLOSE,
FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

LEAD ANALYST: A.J.MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) HELIUM SUPPLY
- 3) PNEUMATIC HELIUM
- 4) GN2 PURGE (ORB/GND) DISC. (ORB HALF)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT FUSELAGE
PART NUMBER: MC276-0003-0007

CAUSES: VIBRATION, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO CLOSE GN2 DISCONNECT VALVE. SYSTEM
DEGRADATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/3
MDAC ID: 5000 ABORT: 3/3

ITEM: LO2 PREVALVE CONTROL CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) AFT LCA 1, 2 & 3
- 7) LO2 PREVALVE CONTROL CIRCUIT
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THESE CIRCUITS PROVIDE POWER, CONTROL AND MONITORING FOR THE LO2
PREVALVES.

THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 78
RESISTORS AND 72 DIODES. THE ITEMS WITH A CRITICALITY OTHER THAN
3 ARE LISTED SEPERATELY UNDER MDAC ID 5001 THROUGH 5076.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5001 ABORT: 3/1R

ITEM: LO2 PREVALVE TOGGLE SWITCH
FAILURE MODE: FAILS (SHORTS) (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) AFT LCA 1, 2 & 3
- 7) PANEL R4
- 8) LO2 PREVALVE TOGGLE SWITCH (3) (S11, S12 & S13)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7456

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5002 ABORT: 3/1R

ITEM: LO2 PREVALVE TOGGLE SWITCH
FAILURE MODE: FAILS (SHORTS) (FALSE CLOSE COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) AFT LCA 1, 2 & 3
- 7) PANEL R4
- 8) LO2 PREVALVE TOGGLE SWITCH (3) (S11, S12 & S13)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7456

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5003 ABORT: 3/1R

ITEM: FUSE (1A) (4 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT CLOSE COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) AFT LCA 1, 2 & 3
- 7) PANEL R4
- 8) FUSE (1A) (12) (F16 THROUGH F24, F49, F50, F51)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME451-0018-0100

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL STRESS, CHEMICAL DEGRADATION

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5004 ABORT: 3/1R

ITEM: FUSE (1A) (4 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) AFT LCA 1, 2 & 3
- 7) PANEL R4
- 8) FUSE (1A) (12) (F16 THROUGH F24, F49, F50, F51)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME451-0018-0100

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL STRESS, CHEMICAL DEGRADATION

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5011 ABORT: 2/1R

ITEM: MDM (FA1)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING
SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 4
- 5) LO2 PREVALVE CLOSING SOLENOID CIRCUITS
- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE
PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE
MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP
INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE
DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE
VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5012 ABORT: 2/1R

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 5
- 5) LO2 PREVALVE CLOSING SOLENOID CIRCUITS
- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5013

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY

SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 6
- 5) LO2 PREVALVE CLOSING SOLENOID CIRCUITS
- 6) MDM (FA3) (56V72A9)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	2/1R
LIFTOFF:	2/1R		TAL:	2/1R
ONORBIT:	3/3		AOA:	2/1R
DEORBIT:	3/3		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5014 ABORT: 2/1R

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING
SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 6
- 5) LO2 PREVALVE CLOSING SOLENOID CIRCUITS
- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE
PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE
MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP
INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE
DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE
VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5015 ABORT: 3/1R

ITEM: MDM (FA1)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS ACTIVATING
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 4
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5016 ABORT: 3/1R

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS ACTIVATING
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 5
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5017 ABORT: 3/1R

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS ACTIVATING
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 6
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA3) (56V72A9)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5018 ABORT: 3/1R

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBITS ACTIVATING
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 6
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5019 ABORT: 3/1R

ITEM: MDM (FA1)
FAILURE MODE: PREMATURE/ERRONEOUS ON (PREMATURELY ACTIVATES
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 4
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE
PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE
MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP
INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE
DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE
VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5020 ABORT: 3/1R

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS ON (PREMATURELY ACTIVATES
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 5
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE
PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE
MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP
INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE
DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE
VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5021 ABORT: 3/1R

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS ON (PREMATURELY ACTIVATES
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 6
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA3) (56V72A9)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	3/1R
LIFTOFF:	3/1R		TAL:	3/1R
ONORBIT:	3/3		AOA:	3/1R
DEORBIT:	3/3		ATO:	3/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE
PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE
MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP
INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE
DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE
VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5022 ABORT: 3/1R

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS ON (PREMATURELY ACTIVATES
OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAY 6
- 5) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE
PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE
MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP
INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE
DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE
VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5031 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)
FAILURE MODE: FAIL ON (FALSE OPEN COMMAND, ACTIVATE LV12, LV14, LV16)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) LO2 PREVALVE OPENING SOLENOID (LV12, LV14 & LV16) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (6) (54V76A121(2), 55V76A122(2), 56V76A123(2))
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5032 ABORT: 3/1R

ITEM: HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV12, LV14 & LV16)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) LO2 PREVALVE OPENING SOLENOID (LV12, LV14 & LV16) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (6) (54V76A121(2), 55V76A122(2),
56V76A123(2))
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/22/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5033	ABORT:	3/1R

ITEM: HYBRID DRIVER, TYPE 1
FAILURE MODE: FAIL OFF (INHIBIT LV12, LV14, LV16)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) LO2 PREVALVE OPENING SOLENOID (LV12, LV14 & LV16) CIRCUIT
- 7) HYBRID DRIVER, TYPE 1 (54V76A121, 55V76A122, 56V76A123)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0261-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5034 ABORT: 3/1R

ITEM: REMOTE POWER CONTROLLER (2 PER CIRCUIT)
FAILURE MODE: FAIL ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) LO2 PREVALVE OPENING SOLENOID (LV12, LV14 & LV16) CIRCUIT
- 7) REMOTE POWER CONTROLLER (6) (RPC38(3), RPC42(3))
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURES DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5035 ABORT: 3/1R

ITEM: DIODE, ISOLATION (12A) (2 PER CIRCUIT)
FAILURE MODE: FAILS OPEN, FAILS TO CONDUCT POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) LO2 PREVALVE OPENING SOLENOID (LV12, LV14 & LV16) CIRCUIT
- 7) DIODE, ISOLATION (12A) (6) (A2CR30(3), A2CR34(3))
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: JANTX1N1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5041 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV13, LV15, LV17)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) LO2 PREVALVE CLOSING SOLENOID (LV13, LV15 & LV17) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (6) (54V76A121(2), 55V76A122(2),
56V76A123(2))
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5042

HIGHEST CRITICALITY
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 1
FAILURE MODE: FAIL OFF (INHIBIT LV13, LV15, LV17)

LEAD ANALYST: HOLDEN/LOWERY
SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) LO2 PREVALVE CLOSING SOLENOID (LV13, LV15 & LV17) CIRCUIT
- 7) HYBRID DRIVER, TYPE 1 (3) (54V76A121, 55V76A122, 56V76A123)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	/NA	RTLS: 2/1R
LIFTOFF:	2/1R	TAL: 2/1R
ONORBIT:	3/3	AOA: 2/1R
DEORBIT:	3/3	ATO: 2/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0261-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5043 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (2 PER CIRCUIT)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV13, LV15, LV17)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) LO2 PREVALVE CLOSING SOLENOID (LV13, LV15 & LV17) CIRCUIT
- 7) REMOTE POWER CONTROLLER (6) (RPC37(3), RPC41(3))
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	2/1R
LIFTOFF:	2/1R		TAL:	2/1R
ONORBIT:	3/3		AOA:	2/1R
DEORBIT:	3/3		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 1, 2 & 3
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5044 ABORT: 2/1R

ITEM: DIODE, ISOLATION (12A) (2 PER CIRCUIT)
FAILURE MODE: FAILS OPEN, FAILS TO CONDUCT POWER (INHIBIT LV13,
LV15, LV17)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) LO2 PREVALVE CLOSING SOLENOID (LV13, LV15 & LV17) CIRCUIT
- 7) DIODE, ISOLATION (12A) (6) (A2CR29(3), A2CR33(3))
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: JANTX1N1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE
PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE
MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP
INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE
DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE
VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11,
11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5051 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV80, LV81, LV82)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
 - 4) AVIONICS BAYS 4, 5 & 6
 - 5) AFT LCA 1, 2 & 3
 - 6) LO2 PREVALVE REDUNDANT CLOSING SOLENOID (LV80, LV81 & LV82)
- CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (6) (54V76A121(2), 55V76A122(2), 56V76A123(2))
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5052 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (2 PER CIRCUIT)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV80, LV81, LV82)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
 - 4) AVIONICS BAYS 4, 5 & 6
 - 5) AFT PCA 4, 5 & 6
 - 6) LO2 PREVALVE REDUNDANT CLOSING SOLENOID (LV80, LV81 & LV82)
- CIRCUIT
- 7) REMOTE POWER CONTROLLER (6) (RPC27(3), RPC28(3))
 - 8)
 - 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	2/1R
LIFTOFF:	2/1R		TAL:	2/1R
ONORBIT:	3/3		AOA:	2/1R
DEORBIT:	3/3		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/20/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5053	ABORT:	2/1R

ITEM: DIODE, ISOLATION (12A) (2 PER CIRCUIT)
FAILURE MODE: FAILS OPEN, FAILS TO CONDUCT POWER (INHIBIT LV80, LV81, LV82)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
 - 4) AVIONICS BAYS 4, 5 & 6
 - 5) AFT PCA 4, 5 & 6
 - 6) LO2 PREVALVE REDUNDANT CLOSING SOLENOID (LV80, LV81 & LV82)
- CIRCUIT
- 7) DIODE, ISOLATION (12A) (6) (A2CR19(3), A2CR20(3))
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: JANTX1N1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5062 ABORT: 3/1R

ITEM: HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV83, LV84 & LV85)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
 - 4) AVIONICS BAYS 4, 5 & 6
 - 5) AFT LCA 1, 2 & 3
 - 6) LO2 PREVALVE REDUNDANT OPENING SOLENOID (LV83, LV84 & LV85)
- CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (6) (54V76A121(2), 55V76A122(2), 56V76A123(2))
 - 8)
 - 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/22/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5063	ABORT:	3/1R

ITEM: REMOTE POWER CONTROLLER (2 PER CIRCUIT)
FAILURE MODE: FAIL ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
 - 4) AVIONICS BAYS 4, 5 & 6
 - 5) AFT PCA 4, 5 & 6
 - 6) LO2 PREVALVE REDUNDANT OPENING SOLENOID (LV83, LV84 & LV85)
- CIRCUIT
- 7) REMOTE POWER CONTROLLER (6) (RPC13(3), RPC44(3))
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/22/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5064	ABORT:	3/1R

ITEM: DIODE, ISOLATION (12A) (2 PER CIRCUIT)
FAILURE MODE: FAILS OPEN, FAILS TO CONDUCT POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
 - 4) AVIONICS BAYS 4, 5 & 6
 - 5) AFT PCA 4, 5 & 6
 - 6) LO2 PREVALVE REDUNDANT OPENING SOLENOID (LV83, LV84 & LV85)
- CIRCUIT
- 7) DIODE, ISOLATION (12A) (6) (A2CR35(3), A2CR36(3))
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: JANTX1N1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF THIS PART WILL ALLOW ONE OF THE PREVALVES (PV1, PV2 & PV3) TO CLOSE PREMATURELY (FAIL TO REMAIN OPEN). THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5071	ABORT:	3/1R

ITEM: DIODE (10 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT OPEN COMMAND TO OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) DIODE BOARDS 56V76A207, 208 & 209
- 6) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 7) DIODE (30)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: DIODE BOARDS 56V76A207, 208 & 209
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF ONE OF THESE DIODES WILL CAUSE THE LOSS OF THE OPEN COMMAND. ONE OF THE PREVALVES (PV1, PV2 & PV3) WILL CLOSE PREMATURELY (FAIL TO REMAIN OPEN) IF ALL REDUNDANCY IS LOST. THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5072	ABORT:	3/1R

ITEM: DIODE (2 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT OPEN COMMAND TO OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT PCA 4, 5 & 6
- 6) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 7) DIODE (6) (A1CR29(3), A1CR46(3))
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF ONE OF THESE DIODES WILL CAUSE THE LOSS OF THE OPEN COMMAND. ONE OF THE PREVALVES (PV1, PV2 & PV3) WILL CLOSE PREMATURELY (FAIL TO REMAIN OPEN) IF ALL REDUNDANCY IS LOST. THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

**INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5073	ABORT:	3/1R

ITEM: DIODE (3 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT OPEN COMMAND TO OPENING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) LO2 PREVALVE OPENING SOLENOID CIRCUITS
- 7) DIODE (9)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF ONE OF THESE DIODES WILL CAUSE THE LOSS OF THE OPEN COMMAND. ONE OF THE PREVALVES (PV1, PV2 & PV3) WILL CLOSE PREMATURELY (FAIL TO REMAIN OPEN) IF ALL REDUNDANCY IS LOST. THE RESULTING SYSTEM PRESSURE SURGE COULD CAUSE A RUPTURE OF THE UPSTREAM FEEDLINE, UNCONTAINED ENGINE DAMAGE AND/OR FIRE/EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5074 ABORT: 3/1R

ITEM: DIODE (10 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT CLOSE COMMAND TO CLOSING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) DIODE BOARDS 56V76A207, 208 & 209
- 6) LO2 PREVALVE CLOSING SOLENOID CIRCUITS
- 7) DIODE (30)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	3/1R
LIFTOFF:	3/1R		TAL:	3/1R
ONORBIT:	3/3		AOA:	3/1R
DEORBIT:	3/3		ATO:	3/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: DIODE BOARDS 56V76A207, 208 & 209
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF ONE OF THESE DIODES WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5075	ABORT:	3/1R

ITEM: DIODE (6 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT CLOSE COMMAND TO CLOSING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) PCA 4, 5 & 6
- 6) LO2 PREVALVE CLOSING SOLENOID CIRCUITS
- 7) DIODE (18) (A1CR20(3), A1CR27(3), A1CR28(3), A1CR37(3), A1CR44(3), A1CR45(3))
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 4, 5 & 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF ONE OF THESE DIODES WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5076 ABORT: 3/1R

ITEM: DIODE (7 PER CIRCUIT)
FAILURE MODE: FAILS OPEN (INHIBIT CLOSE COMMAND TO CLOSING SOLENOIDS)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 PREVALVE (1 PER SSME) (PV1, PV2 & PV3)
- 4) AVIONICS BAYS 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) LO2 PREVALVE CLOSING SOLENOID CIRCUITS
- 7) DIODE (21)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	3/1R
LIFTOFF:	3/1R		TAL:	3/1R
ONORBIT:	3/3		AOA:	3/1R
DEORBIT:	3/3		ATO:	3/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FAILURE OF ONE OF THESE DIODES WILL PREVENT THE CLOSURE OF ONE OF THE PREVALVES (PV1, PV2 & PV3). IF THIS FAILURE OCCURS DURING THE MECO SEQUENCE, THERE WILL BE A LOSS OF PRESSURE AT THE LO2 PUMP INLET.

THIS FAILURE COULD CAUSE A PUMP OVERSPEED, UNCONTAINED ENGINE DAMAGE AND/OR EXPLOSION. THE WORST CASE IS THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEETS 10, 10.1, 11, 11.1, 12 & 12.1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/3
MDAC ID: 5120 ABORT: 3/3

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE CONTROL CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 1 & 3
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CONTROL CIRCUIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THIS CIRCUIT PROVIDES POWER, CONTROL AND MONITORING FOR THE LO2
FEEDLINE RELIEF SHUTOFF VALVE.
THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 12
RESISTORS AND 5 DIODES. THE ITEMS WITH A CRITICALITY OTHER THAN
3 ARE LISTED SEPERATELY UNDER MDAC ID 5121 THROUGH 5139.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5121 ABORT: 2/1R

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE TOGGLE SWITCH
FAILURE MODE: FAIL SHORTED OPEN TO BUS (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) PANEL R4
- 5) LO2 FEEDLINE RELIEF VALVE TOGGLE SWITCH (S17)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7354

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/12/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5122	ABORT:	2/1R

ITEM: LO2 FEEDLINE RELIEF SHUTOFF VALVE TOGGLE SWITCH
FAILURE MODE: FAIL PREMATURE OPEN-TO-BUS (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) PANEL R4
- 5) LO2 FEEDLINE RELIEF VALVE TOGGLE SWITCH (S17)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7354

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5123 ABORT: 3/1R

ITEM: RESISTER, LIMIT (1.2K)
FAILURE MODE: FAILS OPEN, SHORTS (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) PANEL R4
- 5) RESISTOR, LIMIT (1.2 K) (3)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: RWR80S1211FR

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL STRESS

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24). THE FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLENT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5124 ABORT: 3/1R

ITEM: HYBRID DRIVER, TYPE 3 (AR42)
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 1
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) HYBRID DRIVER, TYPE 3 (AR42)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLENT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5125 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3 (AR42)
FAILURE MODE: FUSE FAIL ON (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 1
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) HYBRID DRIVER, TYPE 3 (AR42)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	/NA		RTLS:	2/1R
LIFTOFF:	3/3		TAL:	2/1R
ONORBIT:	3/2R		AOA:	2/1R
DEORBIT:	2/1R		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5126 ABORT: 3/1R

ITEM: HYBRID DRIVER, TYPE 3 (AR30)
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 3
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) HYBRID DRIVER, TYPE 3 (AR30)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24), THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLENT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5127 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3 (AR30)
FAILURE MODE: FUSE FAIL ON (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
 - 4) MID PCA 3
 - 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)
- CIRCUIT
- 6) HYBRID DRIVER, TYPE 3 (AR30)
 - 7)
 - 8)
 - 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5128 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (RPC28)
FAILURE MODE: FAIL ON/CLOSED (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
 - 4) MID PCA 1
 - 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)
- CIRCUIT
- 6) REMOTE POWER CONTROLLER (RPC28)
 - 7)
 - 8)
 - 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	/NA	RTLS:	2/1R	
LIFTOFF:	3/3	TAL:	2/1R	
ONORBIT:	3/2R	AOA:	2/1R	
DEORBIT:	2/1R	ATO:	2/1R	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5129 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (RPC32)
FAILURE MODE: FAIL ON/CLOSED (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 3
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) REMOTE POWER CONTROLLER (RPC32)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 3
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/15/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5130	ABORT:	2/1R

ITEM: REMOTE POWER CONTROLLER (RPC32)
FAILURE MODE: FAIL OPEN (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 3
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) REMOTE POWER CONTROLLER (RPC32)
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	3/3	RTLS:		3/1R
LIFTOFF:	3/2R	TAL:		3/1R
ONORBIT:	3/3	AOA:		3/1R
DEORBIT:	3/3	ATO:		3/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 3
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24), THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLENT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5131 ABORT: 3/1R

ITEM: REMOTE POWER CONTROLLER (RPC28)
FAILURE MODE: FAIL OPEN (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 1
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) REMOTE POWER CONTROLLER (RPC28)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24), THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLANT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/12/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5132	ABORT:	2/1R

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS ON (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
 - 4) AVIONICS BAY 6
 - 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)
- CIRCUIT
- 6) MDM (FA3) (56V72A9)
 - 7)
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5133 ABORT: 3/1R

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) AVIONICS BAY 6
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) MDM (FA3) (56V72A9)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/12/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5134	ABORT:	2/1R

ITEM: MDM (FA1)
FAILURE MODE: PREMATURE/ERRONEOUS ON (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) AVIONICS BAY 4
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	/NA	RTLS: 2/1R
LIFTOFF:	3/3	TAL: 2/1R
ONORBIT:	3/2R	AOA: 2/1R
DEORBIT:	2/1R	ATO: 2/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5135 ABORT: 3/1R

ITEM: MDM (FA1)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) AVIONICS BAY 4
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24). THE FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLENT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/12/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5136	ABORT:	2/1R

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS ON (ACTIVATE LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) AVIONICS BAY 5
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL ACTIVATE THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL CLOSE. THE LOSS OF ALL REDUNDANCY AFTER MECO WILL CAUSE THE RUPTURE OF THE FEEDLINE MANIFOLD. THE AFT FUSELAGE WILL BE OVERPRESSURIZED. THE MISSION IS LOST IN THE ONORBIT MISSION PHASE (OUTGASSING GO2 CAN INTERFERE WITH SOME PAYLOADS). THE VEHICLE COULD BE DESTROYED IN THE DEORBIT PHASE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/12/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5137 ABORT: 3/1R

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) AVIONICS BAY 5
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLENT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/16/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5138	ABORT:	3/1R

ITEM: DIODE, ISOLATION (1A, 12A)
FAILURE MODE: FAIL OPEN (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
 - 4) MID PCA 1
 - 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)
- CIRCUIT
- 6) DIODE, ISOLATION (1A, 12A) (4) (A2CR8, A5CR1, A5CR2, A5CR4)
 - 7)
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1
PART NUMBER: JANTXVIN4246, JANT1N1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLANT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5139 ABORT: 3/1R

ITEM: DIODE, ISOLATION (1A, 12A)
FAILURE MODE: FAIL OPEN/SHORT (INHIBIT LV24)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)
- 4) MID PCA 3
- 5) LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)

CIRCUIT

- 6) DIODE, ISOLATION (1A, 12A) (6) (A1CR32, A1CR36, A1CR37, A1CR39, A4CR3, A4CR4)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 3
PART NUMBER: JANTXVIN4246, JANT1N1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL STOP THE OPERATION OF THE HELIUM SOLENOID (LV24). THE LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7) WILL OPEN. PROPELLANT WILL BE VENTED OVERBOARD IF ALL REDUNDANCY IS LOST. THE MISSION WILL BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 19

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/13/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/2
MDAC ID:	5141	ABORT:	1/1

ITEM: LO2 PROPELLENT DUMP SEQUENCE TOGGLE SWITCH
FAILURE MODE: SHORTS (PREMATURE DUMP START)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) PANEL R2
- 4) LO2 PROPELLENT DUMP SEQUENCE TOGGLE SWITCH (S1)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7203

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE MPS DUMP COMMAND. IF THIS
COMMAND IS EXECUTED, PROPELLENT WILL BE LOST OVERBOARD. THE
WORST CASE IS THE VEHICLE WILL NOT REACH ORBIT.
THE MISSION MAY BE LOST IF THIS FAILURE OCCURS DURING ASCENT.
THE VEHICLE MAY BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5142 ABORT: 2/1R

ITEM: LO2 PROPELLENT DUMP SEQUENCE TOGGLE SWITCH
FAILURE MODE: FAIL OPEN (DUMP IS NOT STARTED)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) PANEL R2
- 4) LO2 PROPELLENT DUMP SEQUENCE TOGGLE SWITCH (S1)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7203

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THE FAILURE OF THE MPS DUMP WILL LEAVE LO2 TRAPPED IN THE LINES AND IN THE SSMES. THE OUTGASSING OF O2 DURING THE ONORBIT MISSION PHASE COULD INTERFERE WITH SOME PAYLOADS. THE WEIGHT OF THIS TRAPPED LO2 WILL MOVE THE VEHICLE CG PAST THE AFT CG LIMIT. THE WORST CASE IS THE LOSS OF ALL REDUNDANCY WILL CAUSE THE LOSS OF THE VEHICLE DURING THE DEORBIT MISSION PHASE.

REFERENCES: SSWH DWG 10.11A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/13/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5143	ABORT:	2/1R

ITEM: FUSE (F31, F32)
FAILURE MODE: FAIL OPEN (DUMP IS NOT STARTED)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) PANEL R2
- 4) LO2 PROPELLENT DUMP SEQUENCE TOGGLE SWITCH (S1)
- 5) FUSE (2) (F31, F32)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: MC451-0018-0100

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THE FAILURE OF THE MPS DUMP WILL LEAVE LO2 TRAPPED IN THE LINES AND IN THE SSMES. THE OUTGASSING OF O2 DURING THE ONORBIT MISSION PHASE COULD INTERFERE WITH SOME PAYLOADS. THE WEIGHT OF THIS TRAPPED LO2 WILL MOVE THE VEHICLE CG PAST THE AFT CG LIMIT. THE WORST CASE IS THE LOSS OF ALL REDUNDANCY WILL CAUSE THE LOSS OF THE VEHICLE DURING THE DEORBIT MISSION PHASE.

REFERENCES: SSWH DWG 10.11A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/08/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/3
MDAC ID:	5160	ABORT:	3/3

ITEM: LO2 OUTBOARD FILL & DRAIN VALVE CONTROL CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) LO2 OUTBOARD FILL & DRAIN VALVE CONTROL CIRCUIT
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THIS CIRCUIT PROVIDES POWER, CONTROL AND MONITORING FOR THE
OUTBOARD FILL AND DRAIN VALVE.
THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 8
RESISTORS AND 3 DIODES. THE ITEMS WITH A CRITICALITY OTHER THAN
3 ARE LISTED SEPERATELY UNDER MDAC ID 5161 THROUGH 5176.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/24/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5161	ABORT:	3/1R

ITEM: LO2 OUTBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL SHORTED OPEN-TO-BUS

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) PANEL R4
- 7) LO2 OUTBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S6)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7153

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL OPEN. LO2 WILL BE VENTED OVERBOARD. THE MISSION COULD BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/24/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5162 ABORT: 3/1R

ITEM: LO2 OUTBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL PREMATURE OPEN-TO-BUS

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) PANEL R4
- 7) LO2 OUTBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S6)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7153

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL OPEN. LO2 WILL BE VENTED OVERBOARD. THE MISSION COULD BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5163	ABORT:	3/3

ITEM: LO2 OUTBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL OPEN (PREMATURE DEACTIVATE LV28)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) PANEL R4
- 7) LO2 OUTBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S6)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7153

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL DISABLE THE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5164	ABORT:	3/3

ITEM: LO2 OUTBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL SHORTED/PREATURE (FALSE ACTIVATION OF LV29)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) PANEL R4
- 7) LO2 OUTBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S6)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7153

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A FALSE CLOSE COMMAND TO THE CLOSING SOLENOID (LV29). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5165	ABORT:	3/3

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) PANEL R4
- 7) FUSE (1A) (F8)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

LOCATION: FLIGHT STATION
PART NUMBER: ME451-0018-0100

EFFECTS/RATIONALE:

THIS FAILURE WILL DISABLE THE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REPORT DATE 01/16/87

C-507

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/24/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5166	ABORT:	2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON THE OPEN COMMAND

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 7) HYBRID DRIVER, TYPE 3 (56V76A123)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL OPEN. LO2 WILL BE VENTED OVERBOARD. THE MISSION COULD BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/24/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5167	ABORT:	2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL PREMATURE/ERRONEOUS OPEN COMMAND

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 7) HYBRID DRIVER, TYPE 3 (56V76A123)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	3/3	RTLS:		2/1R
LIFTOFF:	3/2R	TAL:		2/1R
ONORBIT:	3/3	AOA:		2/1R
DEORBIT:	3/3	ATO:		2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL OPEN. LO2 WILL BE VENTED OVERBOARD. THE MISSION COULD BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5168

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL OFF (PREMATURE DEACTIVATION LV28)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 7) HYBRID DRIVER, TYPE 3 (56V76A123)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL DISABLE THE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5169

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 3/3

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON (PREMATURE ACTIVATION OF LV29)

LEAD ANALYST: HOLDEN/LOWERY
SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
 - 4) AVIONICS BAY 6
 - 5) AFT LCA 3
 - 6) LO2 OUTBOARD FILL & DRAIN VALVE CLOSING SOLENOID (LV29)
- CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (56V76A209)
 - 8)
 - 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	HDW/FUNC
PRELAUNCH:	2/1R	ABORT	
LIFTOFF:	3/3	RTLS:	3/3
ONORBIT:	3/3	TAL:	3/3
DEORBIT:	3/3	AOA:	3/3
LANDING/SAFING:	3/3	ATO:	3/3

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A FALSE CLOSE COMMAND TO THE CLOSING SOLENOID (LV29). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5170	ABORT:	3/3

ITEM: DIODE, ISOLATION
FAILURE MODE: FAIL OFF (PREMATURE DEACTIVATION LV28)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 7) DIODE (2)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL DISABLE THE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5171	ABORT:	3/3

ITEM: DIODE, ISOLATION
FAILURE MODE: FAIL OFF (PREMATURE DEACTIVATION LV28)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
 - 4) AVIONICS BAY 6
 - 5) DIODE BOARD 55V76A209
 - 6) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)
- CIRCUIT
- 7) DIODE (3A) (2) (CR17, CR18)
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: DIODE BOARD 55V76A209
PART NUMBER: JANTXV1N5551

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL DISABLE THE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/24/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5172 ABORT: 2/1R

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS ON COMMAND

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING
SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL &
DRAIN VALVE (PV9) WILL OPEN. LO2 WILL BE VENTED OVERBOARD.
THE MISSION COULD BE LOST IF THIS FAILURE OCCURS DURING ASCENT.
THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5173	ABORT:	3/3

ITEM: MDM (FA4)
FAILURE MODE: FAIL OFF (PREMATURE DEACTIVATION LV28)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL DISABLE THE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5175	ABORT:	3/3

ITEM: MDM (LA1)
FAILURE MODE: FAIL OFF (PREMATURE DEACTIVATION LV28)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 6) MDM (LA1) (56V72A33)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL DISABLE THE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL CLOSE. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A SUDDEN PRESSURE SPIKE IN THE LINE. THE WORST CASE IS A RUPTURE OF THE ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5176	ABORT:	3/1R

ITEM: MDM (LA1)
FAILURE MODE: FAIL ON (PREMATURE ACTIVATE LV28)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OUTBOARD FILL & DRAIN VALVE (PV9)
- 4) AVIONICS BAY 6
- 5) LO2 OUTBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV28)

CIRCUIT

- 6) MDM (LA1) (56V72A33)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV28). IF ALL REDUNDANCY IS LOST, THE OUTBOARD FILL & DRAIN VALVE (PV9) WILL OPEN. LO2 WILL BE VENTED OVERBOARD. THE MISSION COULD BE LOST IF THIS FAILURE OCCURS DURING ASCENT. THE VEHICLE COULD BE LOST IF THIS FAILURE OCCURS DURING AN ABORT.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/3
MDAC ID:	5500	ABORT:	3/3

ITEM: LO2 INBOARD FILL & DRAIN VALVE CONTROL CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 INBOARD FILL & DRAIN VALVE CONTROL CIRCUIT
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THIS CIRCUIT PROVIDES POWER, CONTROL AND MONITORING FOR THE LO2 INBOARD FILL & DRAIN VALVE.
THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 8 RESISTORS AND 4 DIODES. THE ITEMS WITH A CRITICALITY OTHER THAN 3 ARE LISTED SEPERATELY UNDER MDAC ID 5501 THROUGH 5533.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/06/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5501 ABORT: 3/1R

ITEM: LO2 INBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL SHORTED OPEN-TO-BUS

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) PANEL R4
- 7) LO2 INBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/1R	RTLS:	3/1R	
LIFTOFF:	3/1R	TAL:	3/1R	
ONORBIT:	3/3	AOA:	3/1R	
DEORBIT:	3/3	ATO:	3/1R	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7257

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV30). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST. GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMES. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5502 ABORT: 3/1R

ITEM: LO2 INBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL PREMATURE OPEN-TO-BUS

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) PANEL R4
- 7) LO2 INBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7257

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV30). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST.

GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMS. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5503	ABORT:	3/3

ITEM: LO2 INBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL PREMATURE OFF (INHIBIT LV30)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) PANEL R4
- 7) LO2 INBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7257

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE OPENING SOLENOID (LV30) OPEN COMMAND. THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A PRESSURE SPIKE IN THE LINES. THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5504 ABORT: 3/3

ITEM: LO2 INBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL ON (PREMATURE/ERRONEOUS ACTIVATE LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) PANEL R4
- 7) LO2 INBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7257

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE CLOSE COMMAND TO THE CLOSING SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A PRESSURE SPIKE IN THE LINES. THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5505	ABORT:	3/1R

ITEM: LO2 INBOARD FILL & DRAIN TOGGLE SWITCH
FAILURE MODE: FAIL OPEN/PREMATURE OFF (INHIBIT LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) PANEL R4
- 7) LO2 INBOARD FILL & DRAIN VALVE TOGGLE SWITCH (S7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7257

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE CLOSE COMMAND TO THE CLOSING SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST.
GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMES. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5507	ABORT:	2/1R

ITEM: FUSE (1A)
FAILURE MODE: FAIL OPEN/PREMATURE OFF (INHIBIT LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) PANEL R4
- 7) FUSE (1A) (F10)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: E451-0018-0100

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE CLOSE COMMAND TO THE CLOSING SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST. GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMES. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/06/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5511	ABORT:	2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON THE OPEN COMMAND

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
 - 4) AVIONICS BAY 5
 - 5) AFT LCA 2
 - 6) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)
- CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (2) (56V76A122AR(2))
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/2	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV30). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST.

GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMEs. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/06/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5512	ABORT:	2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL PREMATURE/ERRONEOUS ON THE OPEN COMMAND

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
 - 2) O2
 - 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
 - 4) AVIONICS BAY 5
 - 5) AFT LCA 2
 - 6) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)
- CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (2) (56V76A122AR(2))
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV30). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST.

GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMES. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5513	ABORT:	3/3

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL PREMATURE OFF (INHIBIT LV30)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)

CIRCUIT

- 7) HYBRID DRIVER, TYPE 3 (2) (56V76A122AR(2))
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE OPENING SOLENOID (LV30) OPEN COMMAND. THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A PRESSURE SPIKE IN THE LINES. THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5514 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL OPEN/PREMATURE OFF (INHIBIT LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 INBOARD FILL & DRAIN VALVE CLOSING SOLENOID (LV31)

CIRCUIT

- 7) HYBRID DRIVER, TYPE 3 (56V76A122AR)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE CLOSE COMMAND TO THE CLOSING
SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN
IF ALL REDUNDANCY IS LOST.

GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN
POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMES. THE POSSIBLE
RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND
EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5515	ABORT:	3/3

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON (PREMATURE/ERRONEOUS ACTIVATE LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 INBOARD FILL & DRAIN VALVE CLOSING SOLENOID (LV31)

CIRCUIT

- 7) HYBRID DRIVER, TYPE 3 (56V76A122AR)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	2/1R	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE CLOSE COMMAND TO THE CLOSING SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A PRESSURE SPIKE IN THE LINES. THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/16/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5521	ABORT:	3/1R

ITEM: MDM (FA1)
FAILURE MODE: PREMATURE/ERRONEOUS OPEN COMMAND

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 4
- 5) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)

CIRCUIT

- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE OPEN COMMAND TO THE OPENING SOLENOID (LV30). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST.

GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMES. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5523 ABORT: 3/3

ITEM: MDM (LA1)
FAILURE MODE: FAIL PREMATURE OFF (INHIBIT LV30)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 6
- 5) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)

CIRCUIT

- 6) MDM (LA1) (56V72A33)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE OPENING SOLENOID (LV30) OPEN
COMMAND. THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL
REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL,
THERE WILL BE A PRESSURE SPIKE IN THE LINES.
THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY
LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND
FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5524	ABORT:	3/3

ITEM: MDM (FA1)
FAILURE MODE: FAIL PREMATURE OFF (INHIBIT LV30)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 4
- 5) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)

CIRCUIT

- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE OPENING SOLENOID (LV30) OPEN COMMAND. THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A PRESSURE SPIKE IN THE LINES. THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5525	ABORT:	3/3

ITEM: MDM (FA2)
FAILURE MODE: FAIL ON (PREMATURE/ERRONEOUS ACTIVATE LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) LO2 INBOARD FILL & DRAIN VALVE CLOSING SOLENOID (LV31)

CIRCUIT

- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL GIVE A PREMATURE CLOSE COMMAND TO THE CLOSING SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL, THERE WILL BE A PRESSURE SPIKE IN THE LINES. THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5526	ABORT:	3/1R

ITEM: MDM (FA2)
FAILURE MODE: FAIL OPEN/PREMATURE OFF (INHIBIT LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) LO2 INBOARD FILL & DRAIN VALVE CLOSING SOLENOID (LV31)

CIRCUIT

- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE CLOSE COMMAND OF THE CLOSING SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST.

GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMEs. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/28/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5531	ABORT:	3/3

ITEM: DIODE (2)
FAILURE MODE: FAIL PREMATURE OFF (INHIBIT LV30)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) DIODE BOARD 55V76A208
- 6) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)

CIRCUIT

- 7) DIODES (2) (CR13, CR20)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: DIODE BOARD 55V76A208
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE OPENING SOLENOID (LV30) OPEN
COMMAND. THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL
REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL,
THERE WILL BE A PRESSURE SPIKE IN THE LINES.
THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY
LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND
FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5532 ABORT: 3/3

ITEM: DIODE (3A) (4)
FAILURE MODE: FAIL PREMATURE OFF (INHIBIT LV30)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 INBOARD FILL & DRAIN VALVE OPENING SOLENOID (LV30)

CIRCUIT

- 7) DIODES (3A) (4)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/1R	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: JANTXIN5551

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE OPENING SOLENOID (LV30) OPEN
COMMAND. THE INBOARD FILL & DRAIN VALVE (PV10) WILL CLOSE IF ALL
REDUNDANCY IS LOST. IF THIS FAILURE OCCURS DURING FAST FILL,
THERE WILL BE A PRESSURE SPIKE IN THE LINES.
THE WORST CASE IS THE RUPTURE OF ORBITER AND/OR GSE FACILITY
LINES. THE RESULTS COULD BE AFT FUSELAGE OVERPRESSURIZATION AND
FIRE HAZARD IN THE ORBITER AND ON THE PAD.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5533 ABORT: 3/1R

ITEM: DIODES (2) (3A)
FAILURE MODE: FAIL OPEN/PREATURE OFF (INHIBIT LV31)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 INBOARD FILL & DRAIN VALVE (PV10)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 INBOARD FILL & DRAIN VALVE CLOSING SOLENOID (LV31)

CIRCUIT

- 7) DIODES (2) (3A)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: JANTXIN5551

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE CLOSE COMMAND TO THE CLOSING SOLENOID (LV31). THE INBOARD FILL & DRAIN VALVE (PV10) WILL OPEN IF ALL REDUNDANCY IS LOST. GAS TRAPPED IN THE LINE WOULD ENTER THE FEEDLINES RESULTING IN POTENTIAL CAVITATION OF PUMPS ON ONE OR MORE SSMEs. THE POSSIBLE RESULTS INCLUDE MULTIPLE SSME SHUTDOWN, PUMP DAMAGE, FIRE AND EXPLOSION (LOSS OF VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 17

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/3
MDAC ID: 5550 ABORT: 3/3

ITEM: LO2 OVERBOARD BLEED VALVE CONTROL CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 5 & 6
- 5) AFT PCA 2 & 3
- 6) AFT LCA 2
- 7) LO2 OVERBOARD BLEED VALVE CONTROL CIRCUIT
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THIS CIRCUIT PROVIDES POWER, CONTROL AND MONITORING FOR THE LO2
OVERBOARD BLEED VALVE.

THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 6
RESISTORS. THE ITEMS WITH A CRITICALITY OTHER THAN 3 ARE LISTED
SEPERATELY UNDER MDAC ID 5551 THROUGH 5561.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5551 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (55V76A122AR)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5552 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (56V76A123AR)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5553 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 1
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (56V76A123AR)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0261-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/14/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5554	ABORT:	2/1R

ITEM: REMOTE POWER CONTROLLER (RPC24)
FAILURE MODE: FAIL OPEN (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 5
- 5) AFT PCA 2
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC24)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 2
PART NUMBER: ME450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5555 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (RPC23)
FAILURE MODE: FAIL OPEN (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 6
- 5) AFT PCA 3
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC23)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 3
PART NUMBER: ME450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5556 ABORT: 2/1R

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 5
- 5) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5557 ABORT: 2/1R

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 6
- 5) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 6) MDM (FA3) (56V72A9)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/14/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5558	ABORT:	2/1R

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 6
- 5) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5559

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: DIODE (12A)
FAILURE MODE: FAIL OPEN/SHORT (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 5
- 5) AFT PVA 2
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) DIODE (12A) (2) (A3CR14, A3CR15)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT PCA 2
PART NUMBER: JANTXIN1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/27/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	1/1
MDAC ID:	5560	ABORT:	1/1

ITEM: DIODE (12A)
FAILURE MODE: FAIL OPEN/SHORT (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 6
- 5) AFT PVA 3
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) DIODE (12A) (A2CR7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT PCA 3
PART NUMBER: JANTXIN1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2 OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK. FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 1/1
MDAC ID: 5561 ABORT: 1/1

ITEM: DIODE
FAILURE MODE: FAIL OPEN/SHORT (INHIBIT LV76)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 OVERBOARD BLEED VALVE (PV19)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76) CIRCUIT
- 7) DIODE (2)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	3/3	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT LCA 2
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL INHIBIT THE HELIUM SOLENOID (LV76). THE LO2
OVERBOARD BLEED VALVE (PV19) WILL OPEN. LO2 WILL BE LOST
OVERBOARD. THE POGO SUPPRESSION SYSTEM WILL NOT WORK.
FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL
OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE
WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/19/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/3
MDAC ID:	5600	ABORT:	3/3

ITEM: MPS INSTRUMENT POWER CIRCUIT
FAILURE MODE: FAILS OPEN, SHORTED, INADVERTANT OPERATIONS

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) MPS INSTRUMENT POWER CIRCUIT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION

EFFECTS/RATIONALE:

THIS CIRCUIT PROVIDES POWER TO THE MPS LO2/LH2 MANIFOLD GAGES.
ALL COMPONENTS IN THIS CIRCUIT ARE CRITICALITY 3. THE FAILURE OF
THESE PARTS WILL NOT CAUSE THE LOSS OF THE VEHICLE OR MISSION.

REFERENCES: SSWH DWG 10.11A

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/3
MDAC ID: 5650 ABORT: 3/3

ITEM: GO2 PRESSURE FLOW CONTROL VALVE CONTROL CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) GO2 PRESSURE FLOW CONTROL VALVE (1 PER SSME) (LV53, LV54 & LV55)
- 4) AVIONICS BAY 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) GO2 PRESSURE FLOW CONTROL VALVE CONTROL CIRCUIT
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THESE CIRCUITS PROVIDE POWER, CONTROL AND MONITORING FOR THE GO2 PRESSURE FLOW CONTROL VALVES.

THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 6 DIODES AND 3 RESISTORS. THE ITEMS WITH A CRITICALITY OTHER THAN 3 ARE LISTED SEPERATELY UNDER MDAC ID 5651 THROUGH 5654.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 39

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/15/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5651	ABORT:	3/1R

ITEM: HYBRID DRIVER, TYPE 3 (1 PER CIRCUIT)
FAILURE MODE: FAIL ON (ACTIVATE LV53, LV54, LV55)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) GO2 PRESSURE FLOW CONTROL VALVE (1 PER SSME) (LV53, LV54 & LV55)
- 4) AVIONICS BAY 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) HYBRID DRIVER, TYPE 3 (3) (54V76A121, 55V76A122, 56V76A123)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

GO2 TO PRESSURIZE THE ET LO2 TANK FLOWS THROUGH THE PRESSURE FLOW CONTROL VALVES (LV53, LV54 LV55). THIS FAILURE WILL GIVE A FALSE OPEN COMMAND TO THESE VALVES.
THE WORST CASE IS THE LOSS OF ALL REDUNDANCY WILL RESULT IN THE OVERPRESSURIZATION OF THE ET (LOSS OF THE VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 39

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/15/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5652	ABORT:	2/1R

ITEM: HYBRID DRIVER, TYPE 3 (1 PER CIRCUIT)
FAILURE MODE: FUSE FAIL OPEN (INHIBIT LV53, LV54, LV55)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) GO2 PRESSURE FLOW CONTROL VALVE (1 PER SSME) (LV53, LV54 & LV55)
- 4) AVIONICS BAY 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) HYBRID DRIVER, TYPE 3 (3) (54V76A121, 55V76A122, 56V76A123)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL PREVENT THE OPENING OF THE PRESSURE CONTROL VALVES (LV53, LV54, LV55). GO2 TO PRESSURIZE THE ET LO2 TANK FLOWS THROUGH THESE VALVES. THIS ET LO2 TANK ULLAGE PRESSURE IS NECESSARY FOR THE EFFICIENT OPERATION OF THE SSMES. THE LOSS OF ALL REDUNDANCY DURING AN ABORT CAN CAUSE THE LOSS OF THE VEHICLE (NOT ENOUGH PROPELLENT TO FINISH THE MISSION).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 39

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5653 ABORT: 3/1R

ITEM: HYBRID DRIVER, TYPE 3 (1 PER CIRCUIT)
FAILURE MODE: PREMATURE/ERRONEOUS ON (ACTIVATE LV53, LV54, LV55)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) GO2 PRESSURE FLOW CONTROL VALVE (1 PER SSME) (LV53, LV54 & LV55)
- 4) AVIONICS BAY 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) HYBRID DRIVER, TYPE 3 (3) (54V76A121, 55V76A122, 56V76A123)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

GO2 TO PRESSURIZE THE ET LO2 TANK FLOWS THROUGH THE PRESSURE FLOW CONTROL VALVES (LV53, LV54, LV55). THIS FAILURE WILL GIVE A FALSE OPEN COMMAND TO THESE VALVES.
THE WORST CASE IS THE LOSS OF ALL REDUNDANCY WILL RESULT IN THE OVERPRESSURIZATION OF THE ET (LOSS OF THE VEHICLE).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 39

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5654

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3 (1 PER CIRCUIT)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV53, LV54, LV55)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) GO2 PRESSURE FLOW CONTROL VALVE (1 PER SSME) (LV53, LV54 & LV55)
- 4) AVIONICS BAY 4, 5 & 6
- 5) AFT LCA 1, 2 & 3
- 6) HYBRID DRIVER, TYPE 3 (3) (54V76A121, 55V76A122, 56V76A123)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1, 2 & 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL PREVENT THE OPENING OF THE PRESSURE CONTROL VALVES (LV53, LV54, LV55). GO2 TO PRESSURIZE THE ET LO2 TANK FLOWS THROUGH THESE VALVES. THIS ET LO2 TANK ULLAGE PRESSURE IS NECESSARY FOR THE EFFICIENT OPERATION OF THE SSMES. THE LOSS OF ALL REDUNDANCY DURING AN ABORT CAN CAUSE THE LOSS OF THE VEHICLE (NOT ENOUGH PROPELLENT TO FINISH THE MISSION).

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 39

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5700

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: LO2 POGO ACCUMULATOR RECIRCULATION VALVE CONTROL
CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY
SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 POGO ACCUMULATOR RECIRCULATION VALVE (2) (PV20, PV21)
- 4) AVIONICS BAY 4 & 5
- 5) AFT LCA 1 & 2
- 6) LO2 POGO ACCUMULATOR RECIRCULATION VALVE CONTROL CIRCUIT
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THESE CIRCUITS PROVIDE POWER, CONTROL AND MONITORING FOR THE LO2
POGO ACCUMULATOR RECIRCULATION VALVES.
THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 6
RESISTORS AND 4 DIODES. THE ITEMS WITH A CRITICALITY OTHER THAN
3 ARE LISTED SEPERATELY UNDER MDAC ID 5701 THROUGH 5705.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

**INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5701 ABORT: 3/1R

ITEM: HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)
FAILURE MODE: FAIL ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 POGO ACCUMULATOR RECIRCULATION VALVE (2) (PV20, PV21)
- 4) AVIONICS BAY 4 & 5
- 5) AFT LCA 1 & 2
- 6) LO2 POGO ACCUMULATOR RECIRCULATION VALVE CLOSING SOLENOID (2) (LV77, LV78)
- 7) HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT) (4) (54V76A121AR(2), 55V76A122AR(2))
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/1R	
LIFTOFF:	3/1R	TAL:	3/1R	
ONORBIT:	3/3	AOA:	3/1R	
DEORBIT:	3/3	ATO:	3/1R	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1 & 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL PREMATURELY ACTIVATE THE HELIUM SOLENOIDS (LV77, LV78), CLOSING THE POGO RECIRCULATION VALVES (PV20, PV21). THE LOSS OF ALL REDUNDANCY WILL STOP THE POGO SUPPRESSION SYSTEM. THE FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/14/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/1R
MDAC ID:	5702	ABORT:	3/1R

ITEM: MDM (FA1)
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20)
- 4) AVIONICS BAY 4
- 5) LO2 POGO ACCUMULATOR RECIRCULATION VALVE CLOSING SOLENOID (LV77)
- 6) MDM (FA1) (54V72A7)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 4
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL PREMATURELY ACTIVATE THE HELIUM SOLENOID (LV77), CLOSING THE POGO RECIRCULATION VALVE (PV20). THE LOSS OF ALL REDUNDANCY WILL STOP THE POGO SUPPRESSION SYSTEM. THE FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5703 ABORT: 3/1R

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV21)
- 4) AVIONICS BAY 5
- 5) LO2 POGO ACCUMULATOR RECIRCULATION VALVE CLOSING SOLENOID (LV78)
- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL PREMATURELY ACTIVATE THE HELIUM SOLENOID (LV78), CLOSING THE POGO RECIRCULATION VALVE (PV21). THE LOSS OF ALL REDUNDANCY WILL STOP THE POGO SUPPRESSION SYSTEM. THE FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/1R
MDAC ID: 5705 ABORT: 3/1R

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV21)
- 4) AVIONICS BAY 6
- 5) LO2 POGO ACCUMULATOR RECIRCULATION VALVE CLOSING SOLENOID (LV78)
- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/1R
LIFTOFF:	3/1R	TAL: 3/1R
ONORBIT:	3/3	AOA: 3/1R
DEORBIT:	3/3	ATO: 3/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THIS FAILURE WILL PREMATURELY ACTIVATE THE HELIUM SOLENOID (LV78), CLOSING THE POGO RECIRCULATION VALVE (PV21). THE LOSS OF ALL REDUNDANCY WILL STOP THE POGO SUPPRESSION SYSTEM. THE FAILURE OF THE POGO SUPPRESSION SYSTEM COULD RESULT IN STRUCTURAL OSCILLATIONS AND FEEDLINE PRESSURES OF UNPREDICTABLE AMPLITUDE WHICH COULD LEAD TO THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 14

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/08/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/3
MDAC ID:	5750	ABORT:	3/3

ITEM: ET/ORBITER DISCONNECT VALVE CONTROL CIRCUIT
FAILURE MODE: ALL CREDIBLE MODES: OPENS, SHORTS, LOSS OF POWER

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5 & 6
- 5) AFT PCA 2 & 3
- 6) AFT LCA 2 & 3
- 7) ET/ORBITER DISCONNECT VALVE CONTROL CIRCUIT
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, TEMPERATURE, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THESE CIRCUITS PROVIDE POWER, CONTROL AND MONITORING FOR THE FEED DISCONNECT VALVE.

THE CRITICALITY 3 ITEMS REFERENCED ON THIS SHEET INCLUDE 12 RESISTORS AND 7 DIODES. THE ITEMS WITH A CRITICALITY OTHER THAN 3 ARE LISTED SEPERATELY UNDER MDAC ID 5751 THROUGH 5779.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/08/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5751	ABORT:	3/3

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5752 ABORT: 3/3

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 6) MDM (FA3) (55V72A9)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46)
COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5753 ABORT: 3/3

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 6) MDM (FA4) (55V72A10)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46)
COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/16/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5754	ABORT:	3/3

ITEM: MDM (FA2)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV47)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 6) MDM (FA2) (55V72A8)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 5
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE THE FAILURE OF THE CLOSE COMMAND TO THE CLOSING SOLENOID (LV47) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5755 ABORT: 3/3

ITEM: MDM (FA3)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV47)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 6) MDM (FA3) (56V72A9)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE THE FAILURE OF THE CLOSE COMMAND TO THE CLOSING
SOLENOID (LV47) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87
SUBSYSTEM: EPD&C/MPS
MDAC ID: 5756

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: MDM (FA4)
FAILURE MODE: PREMATURE/ERRONEOUS OFF (INHIBIT LV47)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 6) MDM (FA4) (56V72A10)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 6
PART NUMBER: SEE REFERENCES

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE THE FAILURE OF THE CLOSE COMMAND TO THE CLOSING
SOLENOID (LV47) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5761 ABORT: 3/3

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (56V76A123)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46)
COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/08/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5762	ABORT:	3/3

ITEM: HYBRID DRIVER, TYPE 1
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 7) HYBRID DRIVER, TYPE 1 (56V76A123)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0261-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5763 ABORT: 3/3

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON (FALSE OPEN COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (55V76A122)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46)
COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/08/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	3/2R
MDAC ID:	5764	ABORT:	3/3

ITEM: REMOTE POWER CONTROLLER (RPC 19)
FAILURE MODE: FAIL ON/CLOSED

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT PCA 3
- 6) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 19)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 3
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5765 ABORT: 3/3

ITEM: REMOTE POWER CONTROLLER (RPC 20)
FAILURE MODE: FAIL ON/CLOSED

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) AFT PCA 2
- 6) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 20)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 2
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE A FALSE OPEN COMMAND TO THE OPENING SOLENOID (LV46)
COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5766 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (RPC 19)
FAILURE MODE: FAILS PREMATURE/OFF (INHIBIT LV46)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT PCA 3
- 6) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 19)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 3
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THE FEED DISCONNECT VALVE (PD1) TO FEED THE
SSMES. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME
SHUTDOWN, UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION.
THEREFORE THE LOSS OF THE OPEN COMMAND TO THE OPENING SOLENOID
(LV46) WILL CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5767 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (RPC 20)
FAILURE MODE: FAILS PREMATURE/OFF (INHIBIT LV46)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) AFT PCA 2
- 6) FEED DISCONNECT VALVE OPENING SOLENOID (LV46) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 20)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 2
PART NUMBER: MC450-0017-1030

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THE FEED DISCONNECT VALVE (PD1) TO FEED THE
SSMES. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME
SHUTDOWN, UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION.
THEREFORE THE LOSS OF THE OPEN COMMAND TO THE OPENING SOLENOID
(LV46) WILL CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5771 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON (FALSE CLOSE COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (56V76A123)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THE FEED DISCONNECT VALVE (PD1) TO FEED THE
SSMES. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME
SHUTDOWN, UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION.
THEREFORE A FALSE COMMAND TO THE CLOSING SOLENOID (LV47) WILL
CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5772 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 1
FAILURE MODE: PREMATURE/ERRONEOUS ON (FALSE CLOSE COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT LCA 3
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) HYBRID DRIVER, TYPE 1 (56V76A123)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 3
PART NUMBER: MC477-0261-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THE FEED DISCONNECT VALVE (PD1) TO FEED THE
SSMES. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME
SHUTDOWN, UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION.
THEREFORE A FALSE COMMAND TO THE CLOSING SOLENOID (LV47) WILL
CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5773 ABORT: 2/1R

ITEM: HYBRID DRIVER, TYPE 3
FAILURE MODE: FAIL ON (FALSE CLOSE COMMAND)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) AFT LCA 2
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) HYBRID DRIVER, TYPE 3 (55V76A122)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2
PART NUMBER: MC477-0263-0002

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THE FEED DISCONNECT VALVE (PD1) TO FEED THE
SSMES. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME
SHUTDOWN, UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION.
THEREFORE A FALSE COMMAND TO THE CLOSING SOLENOID (LV47) WILL
CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 2/1R
MDAC ID: 5774 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (RPC 20)
FAILURE MODE: FAIL ON/CLOSED

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT PCA 3
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 20)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	HDW/FUNC
		ABORT	
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 3
PART NUMBER: MC450-0017-1036

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THE FEED DISCONNECT VALVE (PD1) TO FEED THE
SSMES. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME
SHUTDOWN, UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION.
THEREFORE A FALSE COMMAND TO THE CLOSING SOLENOID (LV47) WILL
CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/08/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/1R
MDAC ID:	5775	ABORT:	2/1R

ITEM: REMOTE POWER CONTROLLER (RPC 21)
FAILURE MODE: FAIL ON/CLOSED

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) AFT PCA 2
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 21)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 2
PART NUMBER: MC450-0017-1036

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LO2 MUST FLOW THROUGH THE FEED DISCONNECT VALVE (PD1) TO FEED THE SSMS. THE POSSIBLE RESULTS OF A FLOW INTERRUPTION INCLUDE SSME SHUTDOWN, UNCONTAINED ENGINE DAMAGE AND FIRE/EXPLOSION. THEREFORE A FALSE COMMAND TO THE CLOSING SOLENOID (LV47) WILL CAUSE THE LOSS OF THE VEHICLE.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5776 ABORT: 3/3

ITEM: REMOTE POWER CONTROLLER (RPC 20)
FAILURE MODE: FAIL PREMATURE/OFF (INHIBIT LV47)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT PCA 3
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 20)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 3
PART NUMBER: MC450-0017-1036

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE THE LOSS OF THE CLOSE COMMAND TO THE CLOSING SOLENOID
(LV47) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/MPS FLIGHT: 3/2R
MDAC ID: 5777 ABORT: 3/3

ITEM: REMOTE POWER CONTROLLER (RPC 21)
FAILURE MODE: FAIL PREMATURE/OFF (INHIBIT LV47)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) AFT PCA 2
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) REMOTE POWER CONTROLLER (RPC 21)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT PCA 2
PART NUMBER: MC450-0017-1036

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT
OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD
INTERFERE WITH THE OPERATION OF SOME PAYLOADS.
THEREFORE THE LOSS OF THE CLOSE COMMAND TO THE CLOSING SOLENOID
(LV47) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/27/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/2
MDAC ID:	5778	ABORT:	3/3

ITEM: DIODE (12A)
FAILURE MODE: FAIL OPEN (INHIBIT LV47)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 5
- 5) AFT PCA 2
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) DIODE (12A) (2) (A2CR13, A2CR14)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT PCA 2
PART NUMBER: JANTXIN1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE THE LOSS OF THE CLOSE COMMAND TO THE CLOSING SOLENOID (LV47) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/27/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPD&C/MPS	FLIGHT:	2/2
MDAC ID:	5779	ABORT:	3/3

ITEM: DIODE (12A)
FAILURE MODE: FAIL OPEN (INHIBIT LV47)

LEAD ANALYST: HOLDEN/LOWERY SUBSYS LEAD: A. J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPD&C/MPS
- 2) O2
- 3) ET/ORBITER FEED DISCONNECT VALVE (PD1)
- 4) AVIONICS BAY 6
- 5) AFT PCA 3
- 6) FEED DISCONNECT VALVE CLOSING SOLENOID (LV47) CIRCUIT
- 7) DIODE (12A) (A2CR16)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT PCA 3
PART NUMBER: JANTXIN1204RA

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECH
SHOCK, VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THE FEED DISCONNECT VALVE (PD1) IS CLOSED AFTER MECO TO PREVENT OUTGASSING OF O2 IN THE ONORBIT PHASE. THIS OUTGASSING COULD INTERFERE WITH THE OPERATION OF SOME PAYLOADS. THEREFORE THE LOSS OF THE CLOSE COMMAND TO THE CLOSING SOLENOID (LV47) COULD CAUSE THE LOSS OF THE MISSION.

REFERENCES: SSWH DWG 10.11A; VS72-941099 SHEET 21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6011 ABORT: 3/3

ITEM: POWER & CONTROL CIRCUITS FOR LH2 FEEDLINE
DISCONNECT VALVE
FAILURE MODE: OPEN, SHORTED, INADVERTENT OPERATION, ERRONEOUS
OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) HYDROGEN FEED SYSTEM
- 3) LH2 FEEDLINE DISCONNECT VALVE (PD2)
- 4) HELIUM OPEN/CLOSE CONTROL SOLENOID VALVES (LV48, LV49)
- 5) AVBAY 5,6
- 6) AFT PCA 2,3
- 7) AFT LCA 2,3
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: THERMAL SHOCK, VIBRATION, CONTAMINATION, MECHANICAL
SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED WILL HAVE NO HAZARDOUS EFFECT ON
CREW, VEHICLE OR MISSION AND ARE THUS ASSIGNED CRITICALITY 3/3.
ELECTRICAL COMPONENTS INCLUDED ARE 4 DIODES, 12 MDMS AND 13
RESISTORS. COMPONENTS ASSIGNED CRITICALITIES OTHER THAN 3/3 ARE
ADDRESSED SEPARATELY UNDER MDAC 6012 THROUGH 6016.

REFERENCES: RI DRAWING VS72-941102, SHT 15. MAJOR HARDWARE
ITEMS ASSOCIATED WITH THIS CIRCUITRY ARE THE LH2 FEEDLINE
DISCONNECT VALVE, MC284-0389-0051(0411,0431), AND ITS
CORRESPONDING CONTROL SOLENOIDS, MC284-0404-0021.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6012 ABORT: 2/1R

ITEM: HYBRID DRIVER CONTROLLER (6)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) HYDROGEN FEED SYSTEM
- 3) LH2 FEEDLINE DISCONNECT VALVE (PD2)
- 4) HELIUM OPEN/CLOSE CONTROL SOLENOID VALVES (LV48,LV49)
- 5) AVBAY 5,6
- 6) AFT LCA 2,3
- 7) HYBRID DRIVER CONTROLLER (4 TYPE III, 2 TYPE I)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC477-0263,0002, MC477-0261-0002; 56V76A12AR

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE WILL PREVENT OPERATION (OPEN OR CLOSE) OF THE FEEDLINE DISCONNECT OR MAY ALLOW VALVE TO CLOSE DURING FILL, WITH THE POSSIBLE RESULT A RUPTURE OF THE FEEDLINE MANIFOLD AND CREATION OF A FIRE/EXPLOSION HAZARD. FAILURE CAUSING THE VALVE TO CLOSE DURING POWERED FLIGHT WILL DESTROY THE VEHICLE. FAILURE DURING ASCENT WILL ALLOW LH2 TO ESCAPE THE ET AT SEPARATION, CAUSING RECONTACT WITH THE ORBITER AND LOSS OF VEHICLE, OR RECONTACT MAY CAUSE DAMAGE TO TPS, PREVENTING A SAFE REENTRY. AERO FORCES DURING RTLS WILL PREVENT RECONTACT.

REFERENCES: RI DRAWING VS72-941102, SHT 15.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6013 ABORT: 2/1R

ITEM: REMOTE POWER CONTROLLER (4)
FAILURE MODE: FAIL OPEN, FAIL CLOSED, INADVERTENT OPERATION

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) HYDROGEN FEED SYSTEM
- 3) LH2 FEEDLINE DISCONNECT VALVE (PD2)
- 4) HELIUM OPEN/CLOSE CONTROL SOLENOID VALVES (LV48,LV49)
- 5) AVBAY 5,6
- 6) AFT PCA 2,3
- 7) REMOTE POWER CONTROLLER (4)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC450-0017-1030: 55V76A132RPC22,23,
56V76A133RPC21,22

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE WILL PREVENT OPERATION OF THE FEEDLINE DISCONNECT VALVE. PRELAUNCH FAILURE MAY CAUSE LAUNCH DELAY, OR MAY ALLOW VALVE TO CLOSE DURING FILL, WITH THE POSSIBLE RESULT A RUPTURE OF THE FEEDLINE MANIFOLD AND CREATION OF A FIRE/EXPLOSION HAZARD. FAILURE CAUSING THE VALVE TO CLOSE DURING POWERED FLIGHT WILL DESTROY THE VEHICLE. FAILURE DURING ASCENT WILL ALLOW H2 TO ESCAPE THE ET AND ORBITER AT SEPARATION, CAUSING RECONTACT AND DAMAGE TO TPS TILES, PREVENTING A SAFE REENTRY, OR DESTRUCTION OF THE VEHICLE. AERO FORCES DURING RTLS WILL PREVENT RECONTACT.

REFERENCES: RI DRAWING VS72-941102, SHT 15.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6014 ABORT: 2/1R

ITEM: ISOLATION AND BLOCKING DIODES (6)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) HYDROGEN FEED SYSTEM
- 3) LH2 FEEDLINE DISCONNECT VALVE (PD2)
- 4) HELIUM OPEN/CLOSE CONTROL SOLENOID VALVES (LV48,LV49)
- 5) AVBAY 5,6
- 6) AFT PCA 2,3
- 7) ISOLATION AND BLOCKING DIODES
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION:

PART NUMBER: JANTX1N1204RA: 55V76A132A2CR8,15, 55V76A133A2CR5,6,
55V76A133A3CR5,13

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE WILL PREVENT OPERATION OF THE FEEDLINE DISCONNECT VALVE. PRELAUNCH FAILURE MAY CAUSE LAUNCH DELAY. FAILURE DURING ASCENT WILL ALLOW H2 TO ESCAPE THE ET AND ORBITER AT SEPARATION, CAUSING RECONTACT AND DAMAGE TO TPS TILES, PREVENTING A SAFE REENTRY, OR IMMEDIATE DESTRUCTION OF THE VEHICLE. AERO FORCES DURING RTLS WILL PREVENT RECONTACT.

REFERENCES: RI DRAWING VS72-941102, SHT 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6015 ABORT: 2/1R

ITEM: FLIGHT CRITICAL AFT MDM (3)
FAILURE MODE: FAIL ON, FAIL OFF

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) HYDROGEN FEED SYSTEM
- 3) LH2 FEEDLINE DISCONNECT VALVE (PD2)
- 4) HELIUM OPEN/CLOSE CONTROL SOLENOID VALVES (LV48, LV49)
- 5) AVBAY 5,6
- 6) FLIGHT CRITICAL AFT MDM (3)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES

PART NUMBER: MC615-0004-6110, 5110: 56V72A9, 10, 55V75A14

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE OF A REDUNDANT ITEM WILL PREVENT OPERATION OF THE FEEDLINE DISCONNECT VALVE. PRELAUNCH FAILURE MAY CAUSE LAUNCH DELAY, OR MAY ALLOW VALVE TO CLOSE DURING FILL, WITH THE POSSIBLE RESULT A RUPTURE OF THE FEEDLINE MANIFOLD AND CREATION OF A FIRE/EXPLOSION HAZARD. FAILURE CAUSING THE VALVE TO CLOSE DURING POWERED FLIGHT WILL DESTROY THE VEHICLE. FAILURE DURING ASCENT WILL ALLOW H2 TO ESCAPE THE ET AND ORBITER AT SEPARATION, CAUSING RECONTACT AND DAMAGE TO THE TPS TILES, PREVENTING A SAFE REENTRY, OR IMMEDIATE DESTRUCTION OF THE VEHICLE. AERO FORCES WILL PREVENT RECONTACT DURING RTLS.

REFERENCES: RI DRAWING VS72-941102, SHT 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 1/1
MDAC ID: 6016 ABORT: 1/1

ITEM: INDICATOR SWITCH (PD2)
FAILURE MODE: FAIL OPEN, FAIL TO TRANSFER

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) HYDROGEN FEED SYSTEM
- 3) LH2 FEEDLINE DISCONNECT VALVE (PD2)
- 4) POSITION INDICATOR SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT COMPARTMENT
PART NUMBER: 50V41PD2

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

PRELAUNCH FAILURE MAY CAUSE LAUNCH DELAY. FAILURE DURING ASCENT MAY CAUSE INCORRECT POSITION INDICATION, ALLOWING ET SEP WITH DISCONNECT VALVES OPEN. ESCAPING H2 COULD CAUSE THE ORBITER AND/OR ET TO ROTATE AND RECONTACT EACH OTHER. RECONTACT CAN CAUSE DAMAGE TO TPS TILES, PREVENTING A SAFE REENTRY, OR IMMEDIATE DESTRUCTION OF THE ORBITER. AERO FORCES WILL PREVENT RECONTACT DURING AN RTLS ABORT.

REFERENCES: RI DRAWING VS72-941102, SHT 15

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6021 ABORT: 3/3

ITEM: POWER & CONTROL CIRCUITS FOR LH2 RTLS DUMP VALVES
(2)
FAILURE MODE: OPEN, SHORTED, INADVERTENT OPERATION, ERRONEOUS
OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 RTLS DUMP VALVES (PV17,PV18) NORMALLY CLOSED
- 4) LH2 RTLS DUMP VALVE OPENING SOLENOIDS (LV72,LV73)
- 5) AVBAY 4,6
- 6) AFT LCA 1,3
- 7) MID PCA-3, AFT PCA-1
- 8) VALVE POWER & CONTROL CIRCUITS
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL
SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED WILL HAVE NO HAZARDOUS EFFECT ON
CREW, VEHICLE OR MISSION AND ARE THUS ASSIGNED CRITICALITY 3/3.
ELECTRICAL COMPONENTS INCLUDED ARE 14 RESISTORS, 2 DIODES, 2 MDMS
AND 2 INDICATOR SWITCHES.

REFERENCES: RI DRAWING VS72-941102, SHT 14. MAJOR HARDWARE
ITEMS ASSOCIATED WITH THIS CIRCUITRY ARE THE LH2 RTLS DUMP
VALVES, MC284-0395-0023(0024,0033,0034,0043,0044,0053,0054) AND
THEIR ASSOCIATED OPENING SOLENOIDS, MC284-0404-0012.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6022 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER (6)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 RTLS DUMP VALVES (PV17,PV18) NORMALLY CLOSED
- 4) LH2 RTLS DUMP VALVE OPENING SOLENOIDS (LV72,LV73)
- 5) AVBAY 4,6
- 6) AFT LCA 1,3
- 7) HYBRID DRIVER CONTROLLERS (6)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC477-0261-0002, 56V76A121AR(2); MC477-0263-0002,
56V76A123AR(4)

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL PREVENT LH2 RTLS DUMP. HYDROGEN WILL VENT THROUGH THE RELIEF VALVE DURING RTLS DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6023 ABORT: 3/1R

ITEM: REMOTE POWER CONTROLLER (4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 RTLS DUMP VALVES (PV17,PV18) NORMALLY CLOSED
- 4) LH2 RTLS DUMP VALVE OPENING SOLENOIDS (LV72,LV73)
- 5) AVBAY 4,6
- 6) MID PCA-3, AFT PCA-1
- 7) REMOTE POWER CONTROLLERS (4)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC450-0017: 40V76A27RPC29,30, 54V76A131RPC31,32

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WILL PREVENT LH2 RTLS DUMP VALVES FROM OPERATING. HYDROGEN WILL VENT THROUGH THE RELIEF VALVE DURING RTLS DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6024 ABORT: 3/1R

ITEM: BLOCKING DIODE (4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 RTLS DUMP VALVES (PV17,PV18) NORMALLY CLOSED
- 4) LH2 RTLS DUMP VALVE OPENING SOLENOIDS (LV72,LV73)
- 5) AVBAY 4,6
- 6) AFT PCA-1, MID PCA-3
- 7) BLOCKING DIODES (4)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES

PART NUMBER: JANTX1N1204RA: 40V76A27A4CR7,8, 54V76A131A3CR3,9

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL PREVENT LH2 RTLS DUMP VALVES FROM OPERATING. HYDROGEN WILL VENT THROUGH THE RELIEF VALVE DURING RTLS DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6025 ABORT: 3/1R

ITEM: ISOLATION DIODE (2)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 RTLS DUMP VALVES (PV17,PV18) NORMALLY CLOSED
- 4) LH2 RTLS DUMP VALVE OPENING SOLENOIDS (LV72,LV73)
- 5) AVBAY 4,6
- 6) AFT PCA-1
- 7) ISOLATION DIODES (2)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: JANTX1N1204RA: 54V76A131CR4,10

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WILL PREVENT LH2 RTLS DUMP VALVES FROM OPERATING. HYDROGEN WILL VENT THROUGH THE RELIEF VALVE DURING RTLS DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6026 ABORT: 3/1R

ITEM: FLIGHT CRITICAL AFT MDM (FA1,FA3,FA4)
FAILURE MODE: FAIL ON, INADVERTENT OPERATION

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 RTLS DUMP VALVES (PV17,PV18) NORMALLY CLOSED
- 4) LH2 RTLS DUMP VALVE OPENING SOLENOIDS (LV72,LV73)
- 5) AVBAY 4,6
- 6) MDM (3)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V72A7, 56V72A9,10

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL CAUSE LH2 RTLS DUMP VALVES TO OPEN, ALLOWING LH2 TO ESCAPE THE VEHICLE AND CREATE A FIRE/EXPLOSION HAZARD. LOSS OF LH2 WILL CAUSE ENGINES TO SHUTDOWN EARLY, RESULTING IN LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/16/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6027 ABORT: 3/1R

ITEM: FLIGHT CRITICAL AFT MDM (FA1,FA3,FA4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RTLS DUMP SYSTEM
- 3) LH2 RTLS DUMP VALVES (PV17,PV18) NORMALLY CLOSED
- 4) LH2 RTLS DUMP VALVE OPENING SOLENOIDS (LV72,LV73)
- 5) AVBAY 4,6
- 6) MDM (3)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V72A7, 56V72A9,10

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WILL PREVENT LH2 RTLS DUMP VALVES FROM OPERATING. HYDROGEN WILL VENT THROUGH THE RELIEF VALVE DURING RTLS DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6051 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP VALVE OPENING SOLENOID
ENERGIZING CIRCUITRY
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OR PARTIAL OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) H2 EPDC
- 3) LH2 RECIRCULATION PUMP VALVES (PV14, PV15, PV16)
- 4) LH2 RECIRCULATION PUMP VALVE OPENING SOLENOID (LV36)
- 5) AV BAY 4
- 6) AFT LCA-1
- 7) LH2 RECIRCULATION PUMP VALVE OPENING SOLENOID ENERGIZING CIRCUITRY
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES

PART NUMBER: SEE REFERENCES

CAUSES: CIRCUIT COMPONENT FAILURE

EFFECTS/RATIONALE:

FAILURE MAY CAUSE LAUNCH DELAY. NO HAZARDOUS CONDITION FOR CREW OR VEHICLE.

REFERENCES: VS72-941102, SHT 12.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6061 ABORT: 3/3

ITEM: LH2 RECIRCULATION PUMP CONTROL CIRCUITRY
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OR PARTIAL OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) MPS
- 2) H2 EPDC
- 3) LH2 RECIRCULATION PUMP (PP1, PP2, PP3)
- 4) AV BAYS 4,5,6
- 5) LH2 RECIRCULATION PUMP CONTROL CIRCUITRY
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: CIRCUIT COMPONENT FAILURE

EFFECTS/RATIONALE:
FAILURE MAY CAUSE LAUNCH DELAY. NO HAZARDOUS CONDITION FOR CREW
OR VEHICLE.

REFERENCES: VS72-941102, SHT 12.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87
SUBSYSTEM: EPDC/MPS
MDAC ID: 6071

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: FUSE, 1A (3)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS

SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) FUSES (3)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME451-0018-0100; 32V73A4F12,13,14

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE WILL PRECLUDE MPS DUMP AND INERT. HYDROGEN WILL ESCAPE THROUGH THE RELIEF VALVE DURING ENTRY AND LANDING, CREATING A FIRE/EXPLOSION HAZARD. NO EFFECT ON RTLS BECAUSE RTLS DUMP IS NOT MADE THROUGH FILL & DRAIN VALVES.

REFERENCES: VS72-941102, SHT 13.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6072 ABORT: 2/1R

ITEM: TOGGLE SWITCH
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) TOGGLE SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	/NA
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME452-0102-7256: 32V73A459

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE WILL PRECLUDE MPS DUMP AND INERT. HYDROGEN WILL ESCAPE THROUGH THE RELIEF VALVE DURING ENTRY AND LANDING, CREATING A FIRE/EXPLOSION HAZARD. NO EFFECT ON RTLS BECAUSE RTLS DUMP IS NOT MADE THROUGH FILL & DRAIN VALVES.

REFERENCES: VS72-941102, SHT 13.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6073 ABORT: 2/1R

ITEM: TOGGLE SWITCH
FAILURE MODE: FAIL SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) TOGGLE SWITCH
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME452-0102-7256: 32V73A459

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

SECOND FAILURE DURING TANK FILL MAY CAUSE I/B FILL & DRAIN VALVE TO CLOSE, POSSIBLY RESULTING IN RUPTURE OF THE FILL LINE, RELEASE OF LH2 AND CREATION OF A FIRE/EXPLOSION HAZARD. SECOND FAILURE AFTER ENGINE START MAY ALLOW VALVE TO OPEN, RESULTING IN GAS FROM THE FILL LINE CAUSING CAVITATION IN THE ENGINE PUMPS AND ENGINE EXPLOSION. SECOND FAILURE CAN PRECLUDE MPS DUMP, ALLOWING H2 TO ESCAPE OVERBOARD DURING ENTRY AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: VS72-941102, SHT 13.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6074 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER (4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) AV BAY 4
- 6) AFT LCA-1
- 7) HYBRID DRIVER CONTROLLERS (4)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC477-0263-0002: 54V76A121AR(3)

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL MAKE THE INBOARD FILL & DRAIN VALVE INOPERATIVE. THIS WILL PRECLUDE LH2 DUMP AND ALLOW H2 TO VENT DURING ENTRY AND LANDING, CREATING A FIRE/EXPLOSION HAZARD. NO HAZARD DURING RTLS, SINCE RTLS DUMP DOES NOT USE THE FILL & DRAIN VALVES.

REFERENCES: VS72-941102, SHT 13.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6075 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER
FAILURE MODE: INADVERTENT OUTPUT (SHORTED)

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) AV BAY 4
- 6) AFT LCA-1
- 7) HYBRID DRIVER CONTROLLERS (4)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC477-0263-0002: 54V76A121AR(3)

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

SECOND FAILURE DURING TANK FILL MAY CAUSE INBOARD FILL & DRAIN VALVE TO CLOSE, POSSIBLY RESULTING IN RUPTURE OF FILL & DRAIN LINE, RELEASE OF LH2 AND CREATION OF A FIRE/EXPLOSION HAZARD. SECOND FAILURE CAN PRECLUDE MPS DUMP, ALLOWING H2 TO ESCAPE OVERBOARD DURING ENTRY AND LANDING, CREATING A FIRE/EXPLOSION HAZARD. NO HAZARD DURING RTLS.

REFERENCES: VS72-941102, SHT 13.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6076 ABORT: 3/1R

ITEM: ISOLATION DIODES (16)
FAILURE MODE: FAIL OPEN, FAIL SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) AV BAY 4
- 6) AFT LCA-1
- 7) ISOLATION DIODES (16)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: JANTX 54V76A121CR

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL MAKE THE INBOARD FILL & DRAIN VALVE INOPERATIVE. THIS WILL PRECLUDE LH2 DUMP AND ALLOW H2 TO VENT DURING ENTRY AND LANDING, CREATING A FIRE/EXPLOSION HAZARD. NO HAZARD DURING RTLS, SINCE RTLS DUMP DOES NOT USE THE FILL & DRAIN VALVES.

REFERENCES: VS72-941102, SHT 13.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/22/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/3
MDAC ID:	6077	ABORT:	3/3

ITEM: CURRENT LIMITING RESISTORS (9) AND BLEED RESISTORS (2)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) AV BAY 4
- 6) AFT LCA-1
- 7) CURRENT LIMITING RESISTORS (9) AND BLEED RESISTORS (2)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: RLR07C512GR(7), RLR20C222GR(2), RLR07C182G(2):
54V76A121

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FAILURE WILL HAVE NO HAZARDOUS EFFECT ON CREW OR VEHICLE.

REFERENCES: VS72-941102, SHT 13.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6078 ABORT: 3/1R

ITEM: MDM (FA1, 2, LA1)
FAILURE MODE: FAIL ON, INADVERTENT OPERATION

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) AV BAY 4,5,6
- 6) AFT LCA-1
- 7) MDM
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V72A7, 54V72A8, 56V72A33

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY WILL ALLOW LH2 TO ESCAPE THE VEHICLE THROUGH THE FILL & DRAIN VALVES, CREATING A FIRE/EXPLOSION HAZARD, OR DEPLETION OF FUEL AND EARLY ENGINE SHUTDOWN, CAUSING LOSS OF VEHICLE.

REFERENCES: VS72-941102, SHT 13 AND 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6079 ABORT: 3/3

ITEM: VALVE SWITCH INDICATOR
FAILURE MODE: FAIL OPEN, INADVERTENT OPERATION

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 INBOARD FILL & DRAIN, TOPPING, AND HIGH POINT BLEED VALVES (PV12,PV13,PV22)
- 4) PANEL R4 (SWITCH LOCATION)
- 5) AV BAY 4,5,6
- 6) AFT LCA-1
- 7) VALVE SWITCH INDICATOR (3)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: 50V41PV12,13,22

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FAILURE WILL HAVE NO HAZARDOUS EFFECT ON CREW OR VEHICLE.

REFERENCES: VS72-941102, SHT 13 AND 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6081 ABORT: 2/1R

ITEM: 1A FUSE
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS

SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32,LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) FUSE
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME451-0018-0100

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE WILL PRECLUDE MPS LH2 DUMP. H2 WILL VENT
OVERBOARD DURING DESCENT AND LANDING, CREATING A FIRE/EXPLOSION
HAZARD.

NO HAZARDOUS EFFECT ON RTLS, BECAUSE FILL & DRAIN VALVES ARE NOT
USED DURING RTLS.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/20/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	2/1R
MDAC ID:	6082	ABORT:	2/1R

ITEM: TOGGLE SWITCH, 32V73A438
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32, LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) TOGGLE SWITCH
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 2/1R
ONORBIT:	3/3	AOA: 2/1R
DEORBIT:	2/1R	ATO: 2/1R
LANDING/SAFING:	2/1R	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME452-0102-7153

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND FAILURE WILL PRECLUDE MPS LH2 DUMP. H2 WILL VENT OVERBOARD DURING DESCENT AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

NO HAZARDOUS EFFECT ON RTLS, BECAUSE FILL & DRAIN VALVES ARE NOT USED DURING RTLS.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6083 ABORT: 3/1R

ITEM: TOGGLE SWITCH
FAILURE MODE: FAIL SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32,LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) TOGGLE SWITCH
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH:	1/1R	RTLS: 3/1R
LIFTOFF:	3/1R	TAL: 3/1R
ONORBIT:	3/3	AOA: 3/1R
DEORBIT:	3/1R	ATO: 3/1R
LANDING/SAFING:	3/1R	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME452-0102-7153: 32V73A458

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY CAN LEAD TO SEVERAL CRITICAL SITUATIONS, AS FOLLOWS. FAILURE(S) DURING TANK FILL CAN CAUSE FILL & DRAIN VALVE TO CLOSE, CAUSING RUPTURE OF FILL LINE, RELEASING LH2 AND CREATING A FIRE/EXPLOSION HAZARD. FAILURES DURING POWERED FLIGHT COULD ALLOW FILL & DRAIN VALVES TO OPEN, RELEASING LH2 AND CREATING A FIRE/EXPLOSION HAZARD OR CAUSING EARLY ENGINE SHUTDOWN AND LOSS OF VEHICLE. FAILURES COULD PREVENT LH2 DUMP AND ALLOW H2 TO VENT OVERBOARD DURING ENTRY AND LANDING, CREATING A FIRE/EXPLOSION HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6084 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER (2)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32,LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AV BAY 5
- 7) AFT LCA-2
- 8) HYBRID DRIVER CONTROLLER
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC471-0263-0002

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL PREVENT OPERATION OF OUTBOARD FILL & DRAIN VALVE, PRECLUDING MPS LH2 DUMP AND ALLOWING H2 TO VENT OVERBOARD DURING ENTRY AND LANDING. THIS WILL CREATE A FIRE/EXPLOSION HAZARD AND MAY CAUSE LOSS OF VEHICLE. NO HAZARDOUS EFFECT DURING RTLS, BECAUSE THE O/B FILL & DRAIN VALVE IS NOT USED DURING RTLS MPS DUMP.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6085 ABORT: 2/1R

ITEM: HYBRID DRIVER CONTROLLER
FAILURE MODE: INADVERTENT OUTPUT, SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32,LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AV BAY 5
- 7) AFT LCA-2
- 8) HYBRID DRIVER CONTROLLER
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC471-0263-0002

CAUSES: VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY COULD ALLOW O/B FILL & DRAIN VALVE TO CLOSE DURING TANK FILL, RESULTING IN RUPTURE OF FILL LINE AND RELEASE OF LH2, CREATING A FIRE/EXPLOSION HAZARD. LOSS OF ALL REDUNDANCY DURING POWERED FLIGHT WILL ALLOW BOTH FILL & DRAIN VALVES TO OPEN, RELEASING LH2 AND CAUSING EARLY ENGINE SHUTDOWN, RESULTING IN LOSS OF VEHICLE. LOSS OF ALL REDUNDANCY CAN ALSO PREVENT OPERATION OF O/B FILL & DRAIN VALVE, PRECLUDING LH2 DUMP AND ALLOWING VENTING OF H2 TO CREATE A FIRE/EXPLOSION DURING ENTRY AND LANDING.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/20/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/1R
MDAC ID:	6086	ABORT:	3/1R

ITEM: ISOLATION DIODE (4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32, LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AV BAY 5
- 7) AFT LCA-2
- 8) ISOLATION DIODES (4)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: JANTXV1N5551

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL PREVENT OPERATION OF OUTBOARD FILL & DRAIN VALVE, PRECLUDING MPS LH2 DUMP AND ALLOWING H2 TO VENT OUTBOARD DURING ENTRY AND LANDING. THIS WILL CREATE A FIRE/EXPLOSION HAZARD AND MAY CAUSE LOSS OF VEHICLE. NO HAZARDOUS EFFECT DURING RTLS, BECAUSE THE O/B FILL & DRAIN VALVE IS NOT USED DURING RTLS MPS DUMP.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6087 ABORT: 3/3

ITEM: CURRENT LIMITING RESISTOR (4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32, LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AV BAY 5
- 7) AFT LCA-2
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: RLR07512GR

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:
FAILURE WILL HAVE NO HAZARDOUS EFFECT ON CREW OR VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/26/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/1R
MDAC ID:	6088	ABORT:	3/1R

ITEM: MDM
FAILURE MODE: FAIL OPEN, INADVERTENT OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32,LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AV BAY 5
- 7) MDM FA2
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MDM FA2, 55V72A8

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY WILL PREVENT OPERATION OF OUTBOARD FILL AND DRAIN VALVE, PRECLUDING MPS LH2 DUMP AND ALLOWING H2 TO VENT OVERBOARD DURING ENTRY AND LANDING. THIS WILL CREATE A FIRE/EXPLOSION HAZARD AND MAY CAUSE LOSS OF VEHICLE. NO HAZARDOUS EFFECT DURING RTLS, BECAUSE THE O/B FILL AND DRAIN VALVE IS NOT USED DURING RTLS MPS DUMP.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6089 ABORT: 3/3

ITEM: VALVE SWITCH INDICATOR
FAILURE MODE: FAIL OPEN, SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 OUTBOARD FILL & DRAIN VALVE (PV11)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV32,LV33)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) VALVE SWITCH INDICATOR
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: 50V411PV11

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
THE FAILURE WILL HAVE NO HAZARDOUS EFFECT ON CREW OR VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6101 ABORT: 3/3

ITEM: LH2 FEEDLINE RELIEF ISOLATION VALVE POWER AND
CONTROL CIRCUITS
FAILURE MODE: LOSS OF OUTPUT, ERRONEOUS OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 FILL & DRAIN SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH POSITION)
- 6) MID PCA-1, -3
- 7) VALVE POWER AND CONTROL CIRCUITS
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCES WILL NOT AFFECT CREW, VEHICLE OR MISSION. ELECTRICAL ITEMS INCLUDED ARE 5 RESISTORS, 2 DIODES AND 2 MDMS. ELECTRICAL ITEMS WITH A CRITICALITY OTHER THAN 3/3 ARE LISTED SEPARATELY UNDER MDAC ID 6102 THROUGH 6109.

REFERENCES: RI DRAWING VS72-941102 SHT 14. MAJOR HARDWARE ASSOCIATED WITH THIS CIRCULTRY IS THE LH2 FEEDLINE RELIEF ISOLATION VALVE.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6102 ABORT: 3/1R

ITEM: REMOTE POWER CONTROLLER (2)
FAILURE MODE: FAIL OPEN, INADVERTENT OPERATION

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) MID PCA-1, -3
- 7) RPC 24, 31
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC450-0017-1030: 40V76A25AR48, 40V76A27AR29

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY MAY CAUSE ISOLATION VALVE TO OPEN DURING PRELAUNCH OR POWERED FLIGHT. ESCAPING H2 WILL CREATE A FIRE/EXPLOSION HAZARD. FAILURE OF REDUNDANT ITEMS CAN ALSO PREVENT VALVE FROM OPENING AT MECO, ALLOWING RUPUTRE OF LH2 FEEDLINE MANIFOLD AND LOSS OF VEHICLE.

REFERENCES: VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6104 ABORT: 3/1R

ITEM: TOGGLE SWITCH
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) TOGGLE SWITCH
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FWD FLIGHT DECK, PANEL R4
PART NUMBER: ME452-0102-7354: 32V73A458

CAUSES: VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY MAY CAUSE NORMALLY OPEN ISOLATION VALVE TO OPEN DURING PRELAUNCH OR POWERED FLIGHT. ESCAPING H2 WILL CREATE FIRE/EXPLOSION HAZARD. LOSS OF FUEL COULD ALSO CAUSE EARLY ENGINE SHUTDOWN AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 1/1R
MDAC ID: 6105 ABORT: 1/1R

ITEM: TOGGLE SWITCH
FAILURE MODE: FAIL SHORTED, INADVERTENT OPERATION

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) TOGGLE SWITCH
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1R	RTLS:	1/1R
LIFTOFF:	1/1R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FWD FLIGHT DECK, PANEL R4
PART NUMBER: ME452-0102-7354: 32V73A458

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

A SHORT ACROSS THE "OPEN" CONTACTS WILL OVERRIDE REDUNDANT CLOSE COMMANDS AND TURN OFF REDUNDANT VALVE DRIVERS. THE ISOLATION VALVE WILL OPEN AND ESCAPING H2 WILL CREATE A FIRE/EXPLOSION HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6106 ABORT: 3/1R

ITEM: CURRENT LIMITING RESISTOR (3)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) MID PCA-1, -3
- 7) CURRENT LIMITING RESISTORS (3)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: RWR8051211FR: 32V73A4A9R1, 32V73A4ABR3

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY MAY CAUSE NORMALLY OPEN ISOLATION VALVE TO OPEN DURING PRELAUNCH OR POWERED FLIGHT. ESCAPING H2 WILL CREATE A FIRE/EXPLOSION HAZARD. LOSS OF FUEL COULD ALSO CAUSE EARLY ENGINE SHUTDOWN AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6107 ABORT: 3/1R

ITEM: ISOLATION DIODE (11)
FAILURE MODE: FAIL OPEN, FAIL SHORTED, OUT OF TOLERANCE, LEAKAGE

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) MID PCA -1, -3
- 7) ISOLATION DIODES (11)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/1R	RTLS: 3/1R
LIFTOFF:	3/1R	TAL: 3/1R
ONORBIT:	3/3	AOA: 3/1R
DEORBIT:	3/3	ATO: 3/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: JANTXV1N424C: 3273A4CR

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY MAY CAUSE NORMALLY OPEN ISOLATION VALVE TO OPEN DURING PRELAUNCH OR POWERED FLIGHT. ESCAPING H2 WILL CREATE A FIRE/EXPLOSION HAZARD. LOSS OF FUEL COULD ALSO CAUSE EARLY ENGINE SHUTDOWN AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6108 ABORT: 2/1R

ITEM: ISOLATION DIODE (3)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) MID PCA -1, -3
- 7) ISOLATION DIODES (3)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [1] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: JANTX1N1204RA: 40V76A25ACR11, 4076A27A4CR1, CR2

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
SECOND FAILURE MAY CAUSE NORMALLY OPEN ISOLATION VALVE TO OPEN DURING PRELAUNCH OR POWERED FLIGHT. ESCAPING H2 WILL CREATE A FIRE/EXPLOSION HAZARD. LOSS OF FUEL COULD ALSO CAUSE EARLY ENGINE SHUTDOWN AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6109 ABORT: 3/1R

ITEM: MDM (FA1, FA3, FA4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 DUMP SYSTEM
- 3) LH2 FEEDLINE RELIEF ISOLATION VALVE (PV8)
- 4) LH2 FEEDLINE RELIEF ISOLATION VALVE CLOSING SOLENOID (LV25)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AV BAY 4, 6
- 7) MDM FA1, FA3, FA4
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V75A13, 54V75A15, 54V72A9

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY MAY CAUSE NORMALLY OPEN ISOLATION VALVE TO OPEN DURING PRELAUNCH OR POWERED FLIGHT. ESCAPING H2 WILL CREATE A FIRE/EXPLOSION HAZARD. LOSS OF FUEL COULD ALSO CAUSE EARLY ENGINE SHUTDOWN AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 14.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6121 ABORT: 1/1R

ITEM: HYBRID DRIVER CONTROLLER
FAILURE MODE: FAIL ON, SHORTED, INADVERTENT OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION FLOW CONTROL VALVE (LV56,LV57,LV58)
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AVBAY 4,5,6
- 6) AFT LCA-1,-2,-3
- 7) HYBRID DRIVER CONTROLLERS (6)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1R
LIFTOFF:	2/1R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V76A121, 55V76A122, 56V76A123

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND ASSOCIATED FAILURE WILL CAUSE TWO FLOW CONTROL VALVES TO BE OPEN UNNECESSARILY. THIS WILL RESULT IN OVERPRESSURIZATION OF LH2 TANK. RELIEVING OF EXCESS GH2 PRESSURE AT LOW ALTITUDE WILL CREATE A FIRE/EXPLOSION HAZARD. FIRST FAILURE DURING ABORTS (ONE ENGINE OUT) CAN CREATE SUCH A HAZARD.

REFERENCES: RI DRAWING VS72-941102, SHT 26.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6122 ABORT: 1/1R

ITEM: HYBRID DRIVER CONTROLLER
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION FLOW CONTROL VALVE (LV56,LV57,LV58)
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AVBAY 4,5,6
- 6) AFT LCA-1,-2,-3
- 7) HYBRID DRIVER CONTROLLERS (6)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1R
LIFTOFF:	2/1R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V76A121, 55V76A122, 56V76A123

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

SECOND ASSOCIATED FAILURE WILL PREVENT TWO FLOW CONTROL VALVES FROM OPENING WHEN THEY SHOULD. THIS WILL RESULT IN LOW ULLAGE PRESSURE AND POSSIBLE LOSS OF VEHICLE. FIRST FAILURE DURING ABORTS (ONE ENGINE ALREADY OUT) CAN CAUSE LOW ULLAGE PRESSURE AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 26.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6123 ABORT: 1/1R

ITEM: FUSE (3)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 TANK PRESSURIZATION SYSTEM
- 3) GH2 PRESSURIZATION FLOW CONTROL VALVE (LV56,LV57,LV58)
- 4) PANEL R2 (SWITCH LOCATION)
- 5) FUSE, 1A (F18,F19,F20)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1R
LIFTOFF:	2/1R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:

SECOND ASSOCIATED FAILURE WILL PREVENT TWO FLOW CONTROL VALVES FROM OPENING WHEN THEY SHOULD. THIS WILL RESULT IN LOW ULLAGE PRESSURE AND POSSIBLE LOSS OF VEHICLE. FIRST FAILURE DURING ABORTS (ONE ENGINE ALREADY OUT) CAN CAUSE LOW ULLAGE PRESSURE AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT 26.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/04/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6131 ABORT: 3/3

ITEM: GH2 PRESSURIZATION LINE VENT VALVE SOLENOID
ENERGIZING CIRCUITRY
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OR PARTIAL OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) GH2 PRESSURIZATION LINE VENT VALVE (LV52)
- 3) AV BAYS 4,5,6
- 4) GH2 PRESSURIZATION LINE VENT VALVE ENERGIZING CIRCUITRY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AFT COMPARTMENT
PART NUMBER: SEE REFERENCES

CAUSES: CIRCUIT COMPONENT FAILURE

EFFECTS/RATIONALE:
FAILURE DOES NOT CREATE A HAZARDOUS CONDITION FOR CREW OR
VEHICLE.

REFERENCES: VS72-941102, SHT 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 1/1
MDAC ID: 6141 ABORT: 1/1

ITEM: MDM (FA4)
FAILURE MODE: FAILS OPEN, INADVERTENT OPERATION, FAILS ON

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION DISCONNECT VALVE (PD3)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV50, LV51)
- 5) AV BAY 6
- 6) MDM FA4
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: 56V72A10

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE WILL PREVENT CLOSURE OF RECIRCULATION DISCONNECT VALVE. IF THE VALVE IS NOT CLOSED AT ET SEP, THE THRUST OF ESCAPING LH2 CAN CAUSE RECONTACT WITH THE ET AND LOSS OF THE ORBITER. IF RECONTACT DAMAGE IS LIMITED TO TPS TILES, THE ORBITER CAN BE DESTROYED DURING ENTRY. AERO FORCES WILL PREVENT RECONTACT FOLLOWING AN RTLS ET SEP.

REFERENCES: VS72-941102, SHT 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 1/1
MDAC ID: 6142 ABORT: 1/1

ITEM: HYBRID DRIVER CONTROLLER (2)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION DISCONNECT VALVE (PD3)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV50, LV51)
- 5) AV BAY 6
- 6) AFT LCA-3
- 7) HYBRID DRIVER CONTROLLERS (2)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	3/3	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: MC471-0263-0002: 56V76A123AR

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE WILL PREVENT CLOSURE OF RECIRCULATION DISCONNECT VALVE. IF THE VALVE IS NOT CLOSED AT ET SEP, THE THRUST OF ESCAPING LH2 CAN CAUSE RECONTACT WITH THE ET AND LOSS OF THE ORBITER. IF RECONTACT DAMAGE IS LIMITED TO TPS TILES, THE ORBITER CAN BE DESTROYED DURING ENTRY.

AERO FORCES WILL PREVENT RECONTACT FOLLOWING AN RTLS ET SEP.

REFERENCES: VS72-941102, SHT 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6143 ABORT: 3/3

ITEM: CURRENT LIMITING RESISTOR, 5.1K (4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION DISCONNECT VALVE (PD3)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV50,LV51)
- 5) AV BAY 6
- 6) AFT LCA-3
- 7) CURRENT LIMITING RESISTORS (4)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: RLR07C512GR: 56V76A123R

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NO HAZARDOUS EFFECT ON CREW OR VEHICLE.

REFERENCES: VS72-941102, SHT 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6144 ABORT: 3/3

ITEM: ISOLATION DIODES (4)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION DISCONNECT VALVE (PD3)
- 4) OPEN/CLOSE CONTROL SOLENOIDS (LV50,LV51)
- 5) AV BAY 6
- 6) AFT LCA-3
- 7) ISOLATION DIODES (4)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: JANTX1N5551: 56V76A123CR

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NO HAZARDOUS EFFECT ON CREW OR VEHICLE.

REFERENCES: VS72-941102, SHT 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6145 ABORT: 3/3

ITEM: POSITION INDICATOR SWITCH
FAILURE MODE: FAIL OPEN, FAIL SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 RECIRCULATION SYSTEM
- 3) LH2 RECIRCULATION DISCONNECT VALVE (PD3)
- 4) POSITION INDICATOR SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: 50V41PD3

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NO HAZARDOUS EFFECT ON CREW OR VEHICLE.

REFERENCES: VS72-941102, SHT 16.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 6151 ABORT: 3/3

ITEM: LH2 PREVALVE POWER & CONTROL CIRCUITS
FAILURE MODE: FAIL OPEN, FAIL SHORTED, INADVERTENT OUTPUT,
ERRONEOUS OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) AFT PCA -4,-5,-6
- 8) AFT LCA -1,-2,-3
- 9) PREVALVE POWER & CONTROL CIRCUITS

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES

PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

ALL CIRCUIT COMPONENTS ARE CRITICALITY 3/3 WITH THE EXCEPTION OF 9 FUSES, 3 SWITCHES, 12 RPCS, 84 DIODES AND 4 MDMS. THESE ITEMS ARE ASSESSED UNDER MDAC ID 6152 THROUGH 6160.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10. MAJOR HARDWARE ASSOCIATED WITH THIS CIRCUITRY IS THE LH2 PREVALVES (3), MC284-0396-0006, AND THEIR ASSOCIATED OPENING AND CLOSING SOLENOIDS (6), MC284-0404-0021.

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INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6152 ABORT: 3/1R

ITEM: FUSE
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) 1A FUSES (9)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME451-0018-0100: 32V73A4F25 THRU F33

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY MAY CAUSE PREVALVE TO CLOSE DURING POWERED FLIGHT, RESULTING IN LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6153 ABORT: 3/1R

ITEM: TOGGLE SWITCH
FAILURE MODE: FAIL OPEN, FAIL CLOSED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) TOGGLE SWITCH (3)
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT		HDW/FUNC
PRELAUNCH:	3/1R	RTLS:		3/1R
LIFTOFF:	3/1R	TAL:		3/1R
ONORBIT:	3/3	AOA:		3/1R
DEORBIT:	3/3	ATO:		3/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FWD FLIGHT DECK, PANEL R4
PART NUMBER: ME452-0102-7354: 32V73A4514, 515, 516

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY COULD CAUSE PREVALVE TO CLOSE DURING
ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/29/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/1R
MDAC ID:	6154	ABORT:	3/1R

ITEM: REMOTE POWER CONTROLLER, 3A
FAILURE MODE: FAIL OPEN, FAIL SHORTED, INADVERTENT OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) AFT PCA -4,-5,-6
- 8) REMOTE POWER CONTROLLERS, 3A (12)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC450-0017-1030: 54V76A134RPC35,36,39,40,
55V76A135RPC35,36,39,40, 56V76A136RPC35,36,39,40

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD CAUSE PREVALVE TO CLOSE DURING
ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6155 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, TYPE I (6)
FAILURE MODE: FAIL OPEN, FAIL SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) AFT LCA -1,-2,-3
- 8) HYBRID DRIVER CONTROLLER, TYPE I (6)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC477-0261-0002: 54V76A121AR(2), 55V76A122AR(2), 55V76A123AR(2)

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY COULD CAUSE PREVALVE TO CLOSE DURING ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6156 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, TYPE III (12)
FAILURE MODE: FAIL OPEN, FAIL SHORTED

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) AFT LCA -1,-2,-3
- 8) HYBRID DRIVER CONTROLLERS, TYPE III (12)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: MC477-0261-0002: 54V76A121AR(4), 55V76A122AR(4), 55V76A123AR(4)

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD CAUSE PREVALVE TO CLOSE DURING ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

DATE:	1/29/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/1R
MDAC ID:	6157	ABORT:	3/1R

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) AFT PCA -4,-5,-6
- 8) ISOLATION DIODES, 12A (18)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

LOCATION: SEE REFERENCES
PART NUMBER: JANTX1N1204RA: 54V76A134A4CR25 THRU 28,31,32,
55V76A135A4CR25 THRU 28,31,32, 56V76A136A4CR25 THRU 28,31,32

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD CAUSE PREVALVE TO CLOSE DURING
ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

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INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6158 ABORT: 3/1R

ITEM: ISOLATION DIODES, 4.2A (3)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) AFT PCA -4,-5,-6
- 8) AFT LCA -1,-2,-3
- 9) ISOLATION DIODES, 4.2A (30)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES

PART NUMBER: JANTXV1N4246: 54V76A134A1CR11,12,15,16,18,
54V76A134A2CR11,12,15,16,18, 55V76A135A1CR11,12,15,16,18,
55V76A135A2CR11,12,15,16,18, 56V76A136A1CR11,12,15,16,18,
56V76A136A2CR11,12,15,16,18

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ALL REDUNDANCY COULD CAUSE PREVALVE TO CLOSE DURING
ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 6159 ABORT: 3/1R

ITEM: ISOLATION DIODE (36)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) AFT PCA -4,-5,-6
- 8) AFT LCA -1,-2,-3
- 9) ISOLATION DIODES (36)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V76A121AXXXXX(12), 55V76A122AXXXXX(12),
56V76A123AXXXXX(12)

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ALL REDUNDANCY COULD CAUSE PREVALVE TO CLOSE DURING
ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 6160 ABORT: 2/1R

ITEM: MODULATOR DEMODULATOR (4)
FAILURE MODE: FAIL OPEN, FAIL SHORTED, ERRONEOUS OUTPUT

LEAD ANALYST: MCNICOLL/EMMONS SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) LH2 PROPELLANT FEED SYSTEM
- 3) LH2 PREVALVES (PV4, PV5, PV6)
- 4) PREVALVE CONTROL SOLENOIDS (LV18, LV19, LV20, LV21, LV22, LV23)
- 5) PANEL R4 (SWITCH LOCATION)
- 6) AVBAY 4,5,6
- 7) MDM FA1, FA2, FA3, FA4
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V72A7, 55V72A8, 56V72A9, 56V72A10

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:
SECOND FAILURE COULD CAUSE PREVALVE TO CLOSE DURING ENGINE BURN, RESULTING IN ENGINE EXPLOSION AND LOSS OF VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHT. 9 AND 10.

DATE:	12/17/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/3
MDAC ID:	7100	ABORT:	3/3

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM ISOLATION VALVES, REG PNL A,B (LV 1,2; 3,4; 5,6)
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AVBAY 4,5,6
- 6) AFT LCA 1,2,3
- 7) AFT PCA 4,5,6
- 8) VALVE POWER & CONTROL CIRCUITS
- 9)

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

FAILURE OF ITEMS REFERENCED ON THIS SHEET WILL NOT EFFECT CREW, VEHICLE, OR MISSION. ALL ARE CRITICALITY 3. ELECTRICAL ITEMS INCLUDED ARE 39 RESISTORS, 18 DIODES, AND 6 REMOTE POWER CONTROLLERS. ELECTRICAL ITEMS WITH A CRITICALITY OTHER THAN 3 ARE LISTED SEPARATELY UNDER MDAC ID 7110 THROUGH 7180.

C-649

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/2R
MDAC ID: 7110 ABORT: 3/1R

ITEM: FUSE, LAMP (9)
FAILURE MODE: OPEN, FAILS TO CONDUCT

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOL VALVE A,B (LV 1,2; 3,4; 5,6)
- 4) AV BAY 4,5,6
- 5) ALCA 1,2,3
- 6) APCA 4,5,6
- 7) PANEL R2
- 8) FUSE (F 76,61,62; 27,25,26; 59,57,58)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME451-0010-0100

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK,
CONTAMINATION

EFFECTS/RATIONALE:

FAILURE TO OPEN OR REMAIN OPEN IS EASILY RECOGNIZABLE. SHOULD THE VALVE FAIL TO REMAIN OPEN DURING ENGINE OPERATION A REDUNDANT SUPPLY ROUTE IS AVAILABLE, BUT ONLY ONE FAILURE AWAY FROM LOSS OF AN ENGINE FROM LOSS OF HELIUM (MISSION FAILURE). DURING ABORTS, SHOULD THIS SCENARIO OCCUR, LOSS OF THE 2ND ENGINE (SEE MPS GRs) RESULTS IN LOSS OF VEHICLE AND CREW.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/18/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7120	ABORT:	3/1R

ITEM: TOGGLE SWITCH, 1P3T (3)
FAILURE MODE: OPEN, FAILS TO TRANSFER, SHORTED

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOLATION 'A' VALVES (LV 1,3,5)
- 4) AV BAY 4,5,6
- 5) ALCA 1,2,3
- 6) PANEL R2
- 7) TOGGLE SWITCH (S 55,56,57)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7103

CAUSES: VIBRATION, MECHANICAL SHOCK, CONTAMINATION, PIECE PART
STRUCTURAL FAILURE.

EFFECTS/RATIONALE:

FAILURE TO OPEN OR REMAIN OPEN IS EASILY RECOGNIZABLE. SHOULD
THE VALVE FAIL TO REMAIN OPEN DURING ENGINE OPERATION A REDUNDANT
SUPPLY ROUTE IS AVAILABLE, BUT ONLY ONE FAILURE AWAY FROM LOSS OF
AN ENGINE FROM LOSS OF HELIUM (MISSION FAILURE). DURING
ABORTS, SHOULD THIS SCENARIO OCCUR, LOSS OF THE 2ND ENGINE (SEE
MPS GRs) RESULTS IN LOSS OF VEHICLE AND CREW.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/18/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/2R
MDAC ID: 7130 ABORT: 3/1R

ITEM: TOGGLE SWITCH, 2P3T (3)
FAILURE MODE: OPEN, FAILS TO TRANSFER, SHORTED

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOLATION 'B' VALVES (LV 2,4,6)
- 4) AV BAY 4,5,6
- 5) ALCA 1,2,3
- 6) APCA 4,5,6
- 7) PANEL R2
- 8) TOGGLE SWITCH (S 12,13,14)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: UNKNOWN

CAUSES: VIBRATION, MECHANICAL SHOCK, CONTAMINATION, PIECE PART
STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE TO OPEN OR REMAIN OPEN IS EASILY RECOGNIZABLE. SHOULD
THE VALVE FAIL TO REMAIN OPEN DURING ENGINE OPERATION A REDUNDANT
SUPPLY ROUTE IS AVAILABLE, BUT ONLY ONE FAILURE AWAY FROM LOSS OF
AN ENGINE FROM LOSS OF HELIUM (MISSION FAILURE). DURING
ABORTS, SHOULD THIS SCENARIO OCCUR, LOSS OF THE 2ND ENGINE (SEE
MPS GRs) RESULTS IN LOSS OF VEHICLE AND CREW.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/18/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7140	ABORT:	3/1R

ITEM: HYBRID DRIVER, TYPE III (3)
FAILURE MODE: OPEN, CLOSE, INADVERTENT OPERATION

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOLATION VALVES 'A' (LV 1,3,5)
- 4) AV BAY 4,5,6
- 5) ALCA 1,2,3
- 6) HYBRID DRIVER (AR #s UNKNOWN)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 1,2,3
PART NUMBER: ME477-0263-0002

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK,
CONTAMINATION

EFFECTS/RATIONALE:

FAILURE TO OPEN OR REMAIN OPEN IS EASILY RECOGNIZABLE. SHOULD THE VALVE FAIL TO REMAIN OPEN DURING ENGINE OPERATION A REDUNDANT SUPPLY ROUTE IS AVAILABLE, BUT ONLY ONE FAILURE AWAY FROM LOSS OF AN ENGINE FROM LOSS OF HELIUM (MISSION FAILURE). DURING ABORTS, SHOULD THIS SCENARIO OCCUR, LOSS OF THE 2ND ENGINE (SEE MPS GRs) RESULTS IN LOSS OF VEHICLE AND CREW.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/18/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7150	ABORT:	3/1R

ITEM: HYBRID DRIVER, TYPE I (6)
FAILURE MODE: OPEN, CLOSE, INADVERTENT OPERATION

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOLATION VALVES 'B' (LV 2,4,6)
- 4) AV BAY 4,5,6
- 5) ALCA 2,3,1
- 6) APCA 6,4,5
- 7) HYBRID DRIVER (AR #s UNKNOWN)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AFT LCA 2,3,1
PART NUMBER: ME477-0261-0002

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK,
CONTAMINATION

EFFECTS/RATIONALE:

FAILURE TO OPEN OR REMAIN OPEN IS EASILY RECOGNIZABLE. SHOULD THE VALVE FAIL TO REMAIN OPEN DURING ENGINE OPERATION A REDUNDANT SUPPLY ROUTE IS AVAILABLE, BUT ONLY ONE FAILURE AWAY FROM LOSS OF AN ENGINE FROM LOSS OF HELIUM (MISSION FAILURE). DURING ABORTS, SHOULD THIS SCENARIO OCCUR, LOSS OF THE 2ND ENGINE (SEE MPS GRs) RESULTS IN LOSS OF VEHICLE AND CREW.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/19/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7160	ABORT:	3/1R

ITEM: ISOLATION DIODES (6)
FAILURE MODE: SHORTED, OPEN

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOLATION VALVES 'B' (LV 2,4,6)
- 4) AV BAY 4,5,6
- 5) APCA 5,6,4
- 6) ISOLATION DIODES (A4CR23, A4CR24)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 5/6; 6/4; 4/5
PART NUMBER: JANTX1N1204RA

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE TO OPEN OR REMAIN OPEN IS EASILY RECOGNIZABLE. SHOULD THE VALVE FAIL TO REMAIN OPEN DURING ENGINE OPERATION A REDUNDANT SUPPLY ROUTE IS AVAILABLE, BUT ONLY ONE FAILURE AWAY FROM LOSS OF AN ENGINE FROM LOSS OF HELIUM (MISSION FAILURE). DURING ABORTS, SHOULD THIS SCENARIO OCCUR, LOSS OF THE 2ND ENGINE (SEE MPS GRs) RESULTS IN LOSS OF VEHICLE AND CREW.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 2/05/87
SUBSYSTEM: EPDC/MPS
MDAC ID: 7170

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/1R

ITEM: ISOLATION DIODES (9)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: EMMONS/MCNEELY

SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOLATION VALVES (LV1,2;3,4;5,6)
- 4) AV BAY 4,5,6
- 5) APCA 4,5,6
- 6) ISOLATION DIODES (A3CR3, A1CR4, -3 EACH)
- 7) ALCA 1,2,3
- 8) ISOLATION DIODES (# UNKNOWN-3)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT PCA 4,5,6; AFT LCA 1,2,3
PART NUMBER: JANTXV1N4246

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THESE DIODES ARE INLINE DEVICES TO THE SWITCHES CONTROLLING EACH OF THE ISOLATION VALVES. LOSS OF ALL REDUNDANCY DURING POWERED FLIGHT MAY RESULT IN LOSS OF MISSION AND IN THE ABORT CASES MAY RESULT IN LOSS OF VEHICLE OR CREW DUE TO LOSS OF HELIUM PURGE TO AN ENGINE.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	2/05/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7180	ABORT:	3/1R

ITEM: ISOLATION DIODES (3)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM SUPPLY ISOLATION VALVES, REG PNL A (LV1,3,5)
- 4) AV BAY
- 5) ALCA 1,2,3
- 6) ISOLATION DIODES (AR # UNKNOWN)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AFT LCAs 1,2,3
PART NUMBER: JANTXY1N4246

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THESE DIODES ARE IN SERIES WITH THE OUTPUT OF MDM CHANNELS SUPPLYING REDUNDANT SIGNALS TO THE HELIUM ISOL VALVES 'A'. COMMANDS THRU THE MDM'S ARE TERMINATED AT MECO. LOSS OF ALL REDUNDANCY DURING POWERED FLIGHT MAY RESULT IN LOSS OF MISSION OR POSSIBLE LOSS OF VEHICLE OR CREW DURING ABORT CASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/2R
MDAC ID: 7190 ABORT: 3/3

ITEM: MDM, FLIGHT AFT 1,2,3,4
FAILURE MODE: FAILS OPEN, ERRONEOUS OUTPUT (OFF)

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM ISOLATION VALVES, REG PNL A,B (LV1,2;3,4;5,6)
- 4) AV BAY 4,5,6
- 5) MDM FA 1,2,3,4
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/2R	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AVIONICS BAYS 4,5,6
PART NUMBER: MC615-0004-6110,5110

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

DURING POWERED FLIGHT THE ISOL VALVES ARE COMMANDED ON THRU THE MDM AS WELL AS FROM PANEL R2. FAILURE TO OUTPUT HAS NO EFFECT UNLESS ACCOMPANIED BY OTHER FAILURES.

REFERENCES: RI DWG VS72-941102 SHT. 17,18,19 AND BOOSTER SYSTEMS BRIEFS, JSC 19401, 1-OCT-1984.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/27/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/3
MDAC ID:	7191	ABORT:	3/3

ITEM: MDM, FLIGHT AFT 1,2,3,4
FAILURE MODE: FAILS SHORTED, ERRONEOUS OUTPUT (ON)

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM ISOLATION VALVES, REG PNL A,B (LV1,2;3,4;5,6)
- 4) AV BAY 4,5,6
- 5) MDM FA 1,2,3,4
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AVIONICS BAYS 4,5,6
PART NUMBER: MC615-0004-6110,5110

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

DURING POWERED FLIGHT THE ISOL VALVES ARE COMMANDED ON THRU THE MDM'S AS WELL AS FROM PANEL R2. FAILING ON DURING THIS PERIOD OR AFTER MECO HAS NO EFFECT. FAILING ON DURING RTLS OR TAL ABORTS HAS NO EFFECT SINCE THE 'B' VALVE OF THE LEFT ENGINE (LV4) IS REQUIRED TO BE OPEN FOR PURGE OF THE AFT COMPARTMENT WHILE ENGINE PNEUMATIC PACKAGE PRESSURE ACTUATED VALVES PREVENT OVERBOARD LOSS OF HELIUM THRU THE ENGINES. FAILING ON HAS NO EFFECT DURING NORMAL ENTRIES AS ISOL VALVES (LV 1,2,3,5,6) ARE PLACED IN THE CLOSED POSITION (CREW) BLOCKING ERRONEOUS MDM OUTPUTS.

REFERENCES: RI DWG VS72-941102 SHT. 17,18,19 AND BOOSTER SYSTEMS BRIEFS, JSC 19401, 1-OCT-1984.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86
SUBSYSTEM: EPDC/MPS
MDAC ID: 7200

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: VALVE POWER AND CONTROL CIRCUITS FOR HELIUM
INTERCONNECT INLET VALVES
FAILURE MODE: OPEN, SHORTED, INADVERTENT OPERATION

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AV BAY 4,5,6
- 6) MPCA 1,2,3
- 7) VALVE POWER AND CONTROL CIRCUITS
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCE
PART NUMBER: SEE REFERENCE

CAUSES: VIBRATION, CONTAMINATION, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED ON THIS SHEET WILL NOT EFFECT CREW, VEHICLE OR MISSION. ALL ARE CRITICALITY 3. ELECTRICAL ITEMS INCLUDED WITHIN THIS SHEET ARE 33 RESISTORS, 12 ISOLATION DIODES, 6 REMOTE POWER CONTROLLERS AND 9 HYBRID DRIVERS. FAILURE MODES FOR COMPONENTS WITH A CRITICALITY OTHER THAN 3 ARE LISTED SEPARATELY UNDER MDAC ID 7210 THROUGH 7260.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19. MAJOR HARDWARE ASSOCIATED WITH THIS CIRCUITRY ARE THE SSME HARDWARE HELIUM INTERCONNECT INLET VALVES (6). ME284-0403-0017(0007).

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/19/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7210	ABORT:	3/1R

ITEM: FUSE, LAMP (6)
FAILURE MODE: OPEN, FAILS TO CONDUCT

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MPCA 1,2,3
- 6) FUSE (F 73,74,75,28,29,30)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME451-0018-0100

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK,
CONTAMINATION

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS IT BECOMES NECESSARY TO SUPPLY PNEUMATIC HELIUM TO AN ENGINE HELIUM PURGE SYSTEM. THE LEFT ENGINE INTERCONNECT INLET VALVE (LV61) IS ALSO CRITICAL TO AFT COMPARTMENT PURGES DURING RTLS AND TAL ABORT LANDING PHASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/2R
MDAC ID: 7220 ABORT: 1/1R

ITEM: TOGGLE SWITCH, 2P3T (3)
FAILURE MODE: OPEN, FAILS TO TRANSFER, SHORTED

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) ALCA 1,2,3
- 6) MPCA 1,2,3
- 7) PANEL R2
- 8) TOGGLE SWITCH (S 9,10,11)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1R
LIFTOFF:	2/2R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: FLIGHT STATION
PART NUMBER: ME452-0102-7203

CAUSES: VIBRATION, MECHANICAL SHOCK, CONTAMINATION, PIECE PART
STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS IT BECOMES NECESSARY TO SUPPLY
PNEUMATIC HELIUM TO AN ENGINE HELIUM PURGE SYSTEM. THE LEFT
ENGINE INTERCONNECT INLET VALVE (LV61) IS ALSO CRITICAL TO AFT
COMPARTMENT PURGES DURING RTLS AND TAL ABORT LANDING PHASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/2R
MDAC ID: 7230 ABORT: 2/1R

ITEM: ISOLATION DIODES (6)
FAILURE MODE: OPEN

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MPCA 1,2,3
- 6) ISOLATION DIODES (A2CR12,15; 14,A4CR9; 10,5)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/3	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1/2; 2/3; 3/1
PART NUMBER: JANTX1N1188RA (35A, A2CR12); JANTX1N1204RA (12A, ALL OTHERS)

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS IT BECOMES NECESSARY TO SUPPLY PNEUMATIC HELIUM TO AN ENGINE HELIUM PURGE SYSTEM. THE LEFT ENGINE INTERCONNECT INLET VALVE (LV61) IS ALSO CRITICAL TO AFT COMPARTMENT PURGES DURING RTLS AND TAL ABORT LANDING PHASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/19/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 2/1R
MDAC ID: 7231 ABORT: 1/1R

ITEM: ISOLATION DIODES (6)
FAILURE MODE: SHORTED

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MPCA 1,2,3
- 6) ISOLATION DIODES (A2CR12,15; 14,A4CR9; 10,5)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1R
LIFTOFF:	2/1R	TAL:	1/1R
ONORBIT:	3/3	AOA:	1/1R
DEORBIT:	3/3	ATO:	1/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: MID PCA 1/2; 2/3; 3/1
PART NUMBER:

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS IT BECOMES NECESSARY TO SUPPLY PNEUMATIC HELIUM TO AN ENGINE HELIUM PURGE SYSTEM. THE LEFT ENGINE INTERCONNECT INLET VALVE (LV61) IS ALSO CRITICAL TO AFT COMPARTMENT PURGES DURING RTLS AND TAL ABORT LANDING PHASES. AN INCREASE IN MAIN BUS VOLTAGE, IN THE REDUNDANT CIRCUIT, ABOVE THE FAILED CIRCUIT BUS VOLTAGE WILL RESULT IN REVERSE CURRENT THRU THE SHORTED DIODE AND RPC. THIS WILL CAUSE THE REDUNDANT RPC TO TURN OFF DUE TO CURRENT OVERLOAD. AS A RESULT, THE HIGHER CRITICALITY IS ASSIGNED TO ABORT CASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	12/19/86	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7240	ABORT:	3/1R

ITEM: REMOTE POWER CONTROLLER (6)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MPCA 1,2,3
- 6) RPCA (39,37; 38,33; 38,34)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1/2; 2/3; 1/3
PART NUMBER: MC450-0017-1050

CAUSES: VIBRATION, THERMAL SHOCK, CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS IT BECOMES NECESSARY TO SUPPLY PNEUMATIC HELIUM TO AN ENGINE HELIUM PURGE SYSTEM. THE LEFT ENGINE INTERCONNECT INLET VALVE (LV61) IS ALSO CRITICAL TO AFT COMPARTMENT PURGES DURING RTLS AND TAL ABORT LANDING PHASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/22/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/2R
MDAC ID: 7250 ABORT: 3/1R

ITEM: HYBRID DRIVER, TYPE I (6)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MPCA 1,2,3
- 6) HYBRID DRIVERS (AR 51,41; 42,31; 32,50)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: MID PCA 1/2; 2/3; 3/1
PART NUMBER: ME477-0261-0002

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK,
CONTAMINATION

EFFECTS/RATIONALE:

FAILURE HAS NO EFFECT UNLESS IT BECOMES NECESSARY TO SUPPLY PNEUMATIC HELIUM TO AN ENGINE HELIUM PURGE SYSTEM. THE LEFT ENGINE INTERCONNECT INLET VALVE (LV61) IS ALSO CRITICAL TO AFT COMPARTMENT PURGES DURING RTLS AND TAL ABORT LANDING PHASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	2/05/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/2R
MDAC ID:	7260	ABORT:	3/1R

ITEM: ISOLATION DIODES (12)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MPCA 1,2,3
- 6) ISOLATION DIODES (A6CR3,4,5,6 - 1 EACH, A5CR3,4,5,6 - 2 EACH)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/2R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: MID PCA 1,2,3
PART NUMBER: JANTXV1N4246

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

THESE DIODES ARE INSTALLED IN SERIES WITH THE OUTPUT OF MDM CHANNELS SUPPLYING REDUNDANT SIGNALS TO THE INTERCONNECT INLET VALVES. COMMANDS THRU THE MDM'S ARE TERMINATED AT MECO. LOSS OF ALL REDUNDANCY DURING POWERED FLIGHT MAY RESULT IN LOSS OF MISSION OR LOSS OF VEHICLE OR CREW DURING ABORT CASES.

REFERENCES: RI DRAWING VS72-941102 SHT. 17, 18, 19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7270 ABORT: 3/1R

ITEM: MDM, FLIGHT AFT 1,2,3
FAILURE MODE: FAILS OPEN, ERRONEOUS OUTPUT (OFF)

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MDM FA 1,2,4
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: AVIONICS BAY 4,5,6
PART NUMBER: MC615-0004-6110,5110

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE TO OUTPUT HAS NO EFFECT DURING POWERED FLIGHT AS THE INLET VALVES ASSOCIATED WITH THESE MDM'S ARE NOT OPENED DURING THIS PERIOD. FAILURE TO OUTPUT DURING AN RTLS OR TAL ABORTS MAY SEVERELY LIMIT THE QUANTITY OF HELIUM AVAILABLE FOR THE AFT COMPARTMENT PURGE. THIS PURGE HAS BEEN IDENTIFIED AS MANDATORY TO PREVENT HYDROGEN ACCUMULATION AND POSSIBLE EXPLOSION DURING THE LANDING PHASE OF THESE ABORTS. NOTE: THE CRITICALITY APPLIES TO THE MDM'S (FA 2,3,) SUPPORTING THE LEFT ENGINE INTERCONNECT INLET VALVE ONLY (LV61). ALL OTHERS ARE CRIT 3.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/29/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7271 ABORT: 3/3

ITEM: MDM, FLIGHT AFT 1,2,3
FAILURE MODE: FAILS SHORTED, ERRONEOUS OUTPUT (ON)

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT INLET VALVES (LV 59,61,63)
- 4) AV BAY 4,5,6
- 5) MDM FA 1,2,4
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: AVIONICS BAY 4,5,6
PART NUMBER: MC615-0004-6110,5110

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF THE MDM IN THIS MODE HAS NO EFFECT ON LOSS OF HELIUM FROM THE SYSTEM. HOWEVER, UNEXPECTED PRESSURE VARIATIONS MAY OCCUR ACROSS THE SYSTEM.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 12/17/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7300 ABORT: 3/3

ITEM: VALVE POWER AND CONTROL CIRCUITS FOR HELIUM
INTERCONNECT OUTLET VALVES
FAILURE MODE: OPEN, SHORTED, INADVERTENT OPERATION

LEAD ANALYST: EMMONS/MCNEELY SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) ENGINE HELIUM SYSTEM
- 3) HELIUM INTERCONNECT OUTLET VALVES (LV 60,62,64)
- 4) AV BAY 4,5,6
- 5) ALCA 1,2,3
- 6) VALVE POWER & CONTROL CIRCUITS
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK,
CONTAMINATION, PIECE PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED ON THIS SHEET WILL NOT EFFECT CREW, VEHICLE OR MISSION. ALL ARE CRITICALITY 3. ELECTRICAL ITEMS INCLUDED WITHIN THIS SHEET ARE 12 RESISTORS, 9 ISOLATION DIODES, 3 HYBRID DRIVERS, 3 SWITCHES, AND 3 FUSES. THE 3 FUSES AND 3 SWITCHES ARE COMMON TO THE SINGLE REDUNDANT STRING OF THE INLET VALVES AND ARE ASSESSED A CRITICALITY OF 3 WITH RESPECT TO THE OUTLET VALVES, BUT NOT THE INLET VALVES. SEE MDAC ID 7210 AND 7220.

REFERENCES: RI DRAWING VS72-941102 SHT. 17,18,19. MAJOR HARDWARE ASSOCIATED WITH THIS CIRCUITRY ARE THE SSME HELIUM INTERCONNECT OUTLET VALVES (6). MC284-0403-0011(-0001).

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7400 ABORT: 3/3

ITEM: PNEUMATIC HELIUM SUPPLY ISOLATION VALVE POWER AND
CONTROL CIRCUIT
FAILURE MODE: OPEN, SHORTED, INADVERTENT OPERATION

LEAD ANALYST: W.J. MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM ISOLATION VALVE, REG PNL 4 (LV7,LV8)
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AVBAY 4,5,6
- 6) AFT LCA 1,2
- 7) VALVE POWER & CONTROL CIRCUITS
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED WILL NOT AFFECT CREW, VEHICLE OR MISSION. ELECTRICAL ITEMS INCLUDED ARE 5 RESISTORS AND 14 DIODES.

REFERENCES: RI DRAWING VS72-941102 SHT 20. MAJOR HARDWARE ASSOCIATED WITH THIS CIRCUITRY ARE THE PNEUMATIC HELIUM ISOLATION VALVES (2), MC284-0403-0011.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7420 ABORT: 3/3

ITEM: PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE POWER
AND CONTROL CIRCUIT
FAILURE MODE: FAILS OPEN, SHORTED, OR INADVERTENT OPERATION

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE (LV10)
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AV BAY 6
- 6) AFT LCA 3
- 7) PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE CONTROL CIRCUIT
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
FAILURE OF ITEMS REFERENCED WILL NOT AFFECT CREW, VEHICLE, OR
MISSION. ELECTRICAL ITEMS INCLUDED ARE 4 RESISTORS AND 2 DIODES.

REFERENCES: RI DRAWING VS72-941102, SHT 18.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7430 ABORT: 3/1R

ITEM: PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE CONTROL
CIRCUIT SWITCH
FAILURE MODE: FAIL TO OPEN, FAIL TO CLOSE, SHORTED TO GROUND

LEAD ANALYST: W.J. MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE (LV10) CONTROL CIRCUIT
- 4) TOGGLE SWITCH (PANEL R2,S54)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FWD FLIGHT DECK
PART NUMBER: ME452-0102-7103

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF SWITCH WILL PREVENT OPERATION OF CROSSOVER VALVE. NO EFFECT ON CREW OR VEHICLE IN NOMINAL FLIGHT BUT LOSS OF CREW OR VEHICLE IN ABORT MODES, DUE TO LOSS OF AFT COMPARTMENT PURGE.

REFERENCES: RI DRAWING VS72-941102 SHT 18.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7440 ABORT: 3/1R

ITEM: PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE CONTROL
CIRCUIT FUSE
FAILURE MODE: FAILS OPEN (PREMATURE/ERRONEOUS)

LEAD ANALYST: W.J. MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE (LV10) CONTROL

CIRCUIT

- 4) PANEL R2 (SWITCH LOCATION)
- 5) FUSE, 1A (F76)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: FWD FLIGHT DECK
PART NUMBER: ME451-0018-0100

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF FUSE WILL PREVENT OPERATION OF CROSSOVER VALVE. NO EFFECT ON CREW OR VEHICLE IN NOMINAL FLIGHT BUT LOSS OF LIFE OR VEHICLE IN ABORT MODES, DUE TO LOSS OF AFT COMPARTMENT PURGE.

REFERENCES: RI DRAWING VS72-941102 SHT 18.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7450 ABORT: 3/1R

ITEM: PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE CONTROL
CIRCUIT ISOLATION DIODES
FAILURE MODE: FAILS OPEN (PREMATURE/ERRONEOUS)

LEAD ANALYST: W.J. MCNICOLL SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE (LV10) CONTROL CIRCUIT
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AVBAY 6
- 6) AFT LCA 3
- 7) ISOLATION DIODES (4)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 56V76A123CR

CAUSES: VIBRATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF ISOLATION DIODES WILL PREVENT OPERATION OF CROSSOVER VALVE. NO EFFECT ON CREW OR VEHICLE IN NOMINAL FLIGHT, BUT LOSS OF CREW OR VEHICLE IN ABORT MODES, DUE TO LOSS OF AFT COMPARTMENT PURGE.

REFERENCES: RI DRAWING VS72-941102 SHT 18.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/08/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7460 ABORT: 3/1R

ITEM: PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE CONTROL
CIRCUIT HYBRID DRIVER CONTROLLER
FAILURE MODE: FAILS OFF (PREMATURE/ERRONEOUS)

LEAD ANALYST: W.J. MCNICOLL SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM CROSSOVER SOLENOID VALVE (LV10) CONTROL CIRCUIT
- 4) PANEL R2 (SWITCH LOCATION)
- 5) AVBAY 6
- 6) AFT LCA 3
- 7) HYBRID DRIVER CONTROLLER
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: ME477-0263-0002

CAUSES: VIBRATION, THERMAL SHOCK, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF DRIVER WILL PREVENT OPERATION OF CROSSOVER VALVE. NO EFFECT ON CREW OR VEHICLE IN NOMINAL FLIGHT, BUT LOSS OF CREW OR VEHICLE IN ABORT MODES, DUE TO LOSS OF AFT COMPARTMENT PURGE.

REFERENCES: RI DRAWING VS72-941102 SHT 18.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7470 ABORT: 3/3

ITEM: HELIUM SUPPLY BLOWDOWN VALVES POWER AND CONTROL
CIRCUIT
FAILURE MODE: FAILS OPEN, SHORTED, OR INADVERTENT OPERATION

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM SUPPLY BLOWDOWN VALVES (LV26,LV27)
- 4) AV BAY 4
- 5) AFT LCA 1
- 6) BLOWDOWN VALVE POWER AND CONTROL CIRCUITS
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED WILL NOT AFFECT CREW, VEHICLE OR
MISSION. ELECTRICAL ITEMS INCLUDED ARE 2 RESISTORS AND 2 DIODES.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7480 ABORT: 3/1R

ITEM: HELIUM SUPPLY BLOWDOWN VALVES CONTROL CIRCUIT
HYBRID DRIVER CONTROLLER
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM SUPPLY BLOWDOWN VALVES (LV20,LV27)
- 4) AV BAY 4
- 5) AFT LCA 1
- 6) BLOWDOWN VALVE CONTROL CIRCUIT HYBRID DRIVER CONTROLLER
(ARIIII)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 54V76A121

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF DRIVER ON WILL ALLOW OFF NOMINAL OPENING OF BLOWDOWN VALVES RESULTING IN LOSS OF HELIUM AVAILABLE FOR LO2 DUMP. LOSS OF LO2 DUMP RESULTS IN LOSS OF FLIGHT CONTROL AND LOSS OF LIFE/VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/27/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/1R
MDAC ID:	7490	ABORT:	3/1R

ITEM: HELIUM SUPPLY BLOWDOWN VALVES CONTROL CIRCUIT MDM
COMMANDS
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) PNEUMATIC HELIUM SUPPLY BLOWDOWN VALVES (LV20,LV27)
- 4) AV BAY 4
- 5) AFT LCA 1
- 6) BLOWDOWN VALVE CONTROL CIRCUIT MDM COMMANDS (FA3,FA4)
- 7)
- 8)
- 9)

	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/1R
LIFTOFF:	3/1R	TAL: 3/1R
ONORBIT:	3/3	AOA: 3/1R
DEORBIT:	3/3	ATO: 3/1R
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: V41K1631N,35N

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF MDM COMMAND ON WILL ALLOW OFF NOMINAL OPENING OF
BLOWDOWN VALVES RESULTING IN LOSS OF HELIUM AVAILABLE FOR LO2
DUMP. LOSS OF LO2 DUMP RESULTS IN LOSS OF FLIGHT CONTROL.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7500 ABORT: 3/3

ITEM: LO2 MANIFOLD REPRESS VALVES POWER AND CONTROL
CIRCUIT
FAILURE MODE: FAILS OPEN, SHORTED OR INADVERTENT OPERATION

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LO2 MANIFOLD REPRESS VALVES (LV40,LV41)
- 4) AV BAY 6
- 5) AFT LCA 3
- 6) LO2 MANIFOLD REPRESS VALVES POWER AND CONTROL CIRCUITS
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES

PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED WILL NOT AFFECT CREW, VEHICLE OR MISSION. ELECTRICAL ITEMS INCLUDED ARE 5 RESISTORS AND 10 DIODES.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	1/27/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	EPDC/MPS	FLIGHT:	3/1R
MDAC ID:	7510	ABORT:	3/1R

ITEM: LO2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT HYBRID
DRIVER CONTROLLER
FAILURE MODE: FAILS OFF (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LO2 MANIFOLD REPRESS VALVES (LV40,LV41)
- 4) AV BAY 6
- 5) AFT LCA 3
- 6) LO2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT HYBRID DRIVER
CONTROLLER (ARIII)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 56V76A123

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF DRIVER OFF WILL NOT ALLOW OPENING OF REPRESS VALVES
RESULTING IN LOSS OF HELIUM AVAILABLE FOR MPS LO2 DUMP. LOSS OF
LO2 DUMP RESULTS IN LOSS OF FLIGHT CONTROL AND LOSS OF
LIFE/VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7520 ABORT: 3/1R

ITEM: LO2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT MDM
COMMANDS
FAILURE MODE: FAILS OFF (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LO2 MANIFOLD REPRESS VALVES (LV40,LV41)
- 4) AV BAY 6
- 5) AFT LCA 3
- 6) LO2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT MDM COMMANDS
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: V41F1535X,37X

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
FAILURE OF MDM COMMANDS OFF WILL NOT ALLOW OPENING OF REPRESS VALVES RESULTING IN LOSS OF HELIUM AVAILABLE FOR MPS LO2 DUMP. LOSS OF LO2 DUMP RESULTS IN LOSS OF FLIGHT CONTROL AND LOSS OF LIFE/VEHICLE.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7540 ABORT: 3/3

ITEM: LH2 MANIFOLD REPRESS VALVES POWER AND CONTROL
CIRCUIT
FAILURE MODE: FAILS OPEN, SHORTED, OR INADVERTENT OPERATION

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LH2 MANIFOLD REPRESS VALVES (LV42,LV43)
- 4) AV BAY 5
- 5) AFT LCA 2
- 6) LH2 MANIFOLD REPRESS VALVES POWER AND CONTROL CIRCUIT
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF ITEMS REFERENCED WILL NOT AFFECT CREW, VEHICLE, OR MISSION. ELECTRICAL ITEMS INCLUDED ARE 5 RESISTORS AND 10 DIODES.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7550 ABORT: 3/1R

ITEM: LH2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT HYBRID
DRIVER CONTROLLER
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LH2 MANIFOLD REPRESS VALVES (LV42,LV43)
- 4) AV BAY 5
- 5) AFT LCA 2
- 6) LH2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT HYBRID DRIVER
CONTROLLER (ARIII)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 55V76A122

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF HYBRID DRIVER CONTROLLER ON WILL ALLOW OFF NOMINAL
OPENING OF THE LH2 MANIFOLD REPRESS VALVES WITH HELIUM INGESTION
INTO ALL THREE MAIN ENGINES RESULTING IN EXPLOSION.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7560 ABORT: 3/1R

ITEM: LH2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT MDM
COMMANDS
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LH2 MANIFOLD REPRESS VALVES (LV42,LV43)
- 4) AV BAY 5
- 5) AFT LCA 2
- 6) LH2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT MDM COMMANDS
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: V41K1435X,37X

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF MDM COMMAND ON WILL ALLOW OFF NOMINAL OPENING OF LH2
MANIFOLD REPRESS VALVES WITH HELIUM INGESTION INTO ALL THREE MAIN
ENGINES RESULTING IN EXPLOSION.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7570 ABORT: 3/1R

ITEM: LH2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT SWITCH
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LH2 MANIFOLD REPRESS VALVES (LV42,LV43)
- 4) PANEL R4
- 5) LH2 MANIFOLD REPRESS VALVES CONTROL CIRCUIT SWITCH (S2)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF THE SWITCH ON WILL ALLOW OFF NOMINAL OPENING OF LH2
MANIFOLD REPRESS VALVES WITH HELIUM INGESTION INTO ALL THREE MAIN
ENGINES RESULTING IN EXPLOSION.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/3
MDAC ID: 7580 ABORT: 3/3

ITEM: LH2 FEED MANIFOLD RTLS PRESS VALVES POWER AND
CONTROL CIRCUIT
FAILURE MODE: FAILS OPEN, SHORTED, OR INADVERTENT OPERATION

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LH2 FEED MANIFOLD RTLS PRESS VALVES (LV74,LV75)
- 4) AV BAY 4
- 5) AFT LCA 1 & 3
- 6) LH2 FEED MANIFOLD RTLS PRESS VALVES POWER AND CONTROL
CIRCUIT
- 7)
- 8)
- 9)

	CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: SEE REFERENCES
PART NUMBER: SEE REFERENCES

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
FAILURE OF ITEMS REFERENCED WILL NOT AFFECT CREW, VEHICLE, OR
MISSION. ELECTRICAL ITEMS INCLUDED ARE 10 RESISTORS AND 8
DIODES.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.1.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7590 ABORT: 3/1R

ITEM: LH2 FEED MANIFOLD RTLS PRESS VALVES REMOTE POWER
CONTROLLER
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J. MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LH2 FEED MANIFOLD RTLS PRESS VALVES (LV74, LV75)
- 4) AV BAY 4
- 5) AFT LCA 1 & 3
- 6) LH2 FEED MANIFOLD RTLS PRESS VALVES REMOTE POWER CONTROLLERS
(RPC27, 28, 29 & 30)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 40V76A27, 54V76A131

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF REMOTE POWER CONTROLLER ON WILL ALLOW OFF NOMINAL
OPENING OF LH2 RTLS PRESS VALVES WITH HELIUM INGESTION INTO ALL
THREE MAIN ENGINES RESULTING IN EXPLOSION.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.1.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7600 ABORT: 3/1R

ITEM: LH2 FEED MANIFOLD RTLS PRESS VALVES HYBRID DRIVER
CONTROLLER
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
 - 2) PNEUMATIC HELIUM SYSTEM
 - 3) LH2 FEED MANIFOLD RTLS PRESS VALVES (LV74,LV75)
 - 4) AV BAY 4
 - 5) AFT LCA 1 & 3
 - 6) LH2 FEED MANIFOLD RTLS PRESS VALVES HYBRID DRIVER
- CONTROLLERS (ARIII)
- 7)
 - 8)
 - 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: 56V76A123, 54V76A121

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF HYBRID DRIVER CONTROLLER ON WILL ALLOW OFF NOMINAL
OPENING OF LH2 RTLS PRESS VALVES WITH HELIUM INGESTION INTO ALL
THREE MAIN ENGINES RESULTING IN EXPLOSION.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.1.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPDC/MPS FLIGHT: 3/1R
MDAC ID: 7610 ABORT: 3/1R

ITEM: LH2 FEED MANIFOLD RTLS PRESS VALVES MDM COMMANDS
FAILURE MODE: FAILS ON (PREMATURE/ERRONEOUS)

LEAD ANALYST: A.J. MARINO SUBSYS LEAD: A.J.MARINO

BREAKDOWN HIERARCHY:

- 1) EPDC/MPS
- 2) PNEUMATIC HELIUM SYSTEM
- 3) LH2 FEED MANIFOLD RTLS PRESS VALVES (LV74,LV75)
- 4) AV BAY 4
- 5) AFT LCA 1 & 3
- 6) LH2 FEED MANIFOLD RTLS PRESS VALVES MDM COMMANDS
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/3	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: SEE REFERENCES
PART NUMBER: V41K1905X, 06X, 07X, 08X, 09X, 10X

CAUSES: VIBRATION, CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF MDM COMMANDS ON WILL ALLOW OFF NOMINAL OPENING OF LH2
RTLS PRESS VALVES WITH HELIUM INGESTION INTO ALL THREE MAIN
ENGINES RESULTING IN EXPLOSION.

REFERENCES: RI DRAWING VS72-941102, SHEET 20.1.

APPENDIX D
POTENTIAL CRITICAL ITEMS

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
1001	GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1002	GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)	FAILS TO CLOSE, FAILS TO TO REMAIN CLOSED, INTERNAL LEAKAGE
1003	GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)	EXTERNAL LEAKAGE
1004	GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19 20)	FAILS TO CLOSE
1005	GO2 PRESSURE ISOLATION CHECK VALVE (CV18, 19, 20)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1006	GO2 PRESSUR ISOLATION CHECK VALVE (CV18, 19, 20)	SPONTANEOUS IGNITION IN/OF PART
1012	LO2 TANK PRE-PRESS CHECK VALVE (CV16)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1013	LO2 TANK PRE-PRESS CHECK VALVE (CV16)	SPONTANEOUS IGNITION IN/OF PART
1014	LO2 TANK PRE-PRESS CHECK VALVE (CV16)	SPONTANEOUS IGNITION IN/OF PART
1021	LO2 BLEED CHECK VALVE (CV31, 33, 35)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1022	LO2 BLEED CHECK VALVE (CV31, 33, 35)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1023	LO2 BLEED CHECK VALVE (CV31, 33, 35)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1024	LO2 BLEED CHECK VALVE (CV31, 33, 35)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1025	LO2 BLEED CHECK VALVE (CV31, 33, 35)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1026	LO2 BLEED CHECK VALVE (CV31, 33, 35)	FAILS TO OPEN
1031	GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)	RESTRICTED FLOW
1032	GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1033	GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1034	GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)	SPONTANEOUS IGNITION IN/OF PART
1035	GO2 PRESSURE FLOW CONTROL VALVE (LV53, 54, 55)	SPONTANEOUS IGNITION IN/OF PART
1041	LO2 FEED (ORB/ET) DISCONNECT (PD1)	FAILS TO OPEN, FAILS TO REMAIN OPEN

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
1042	LO2 FEED (ORB/ET) DISCONNECT (PD1)	EXTERNAL LEAKAGE
1043	LO2 FEED (ORB/ET) DISCONNECT (PD1)	FAILS TO REMAIN OPEN
1044	LO2 FEED (ORB/ET) DISCONNECT (PD1)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1045	LO2 FEED (ORB/ET) DISCONNECT (PD1)	EXTERNAL LEAKAGE
1046	LO2 FEED (ORB/ET) DISCONNECT (PD1)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1052	GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)	FAILS TO REMAIN OPEN
1053	GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)	EXTERNAL LEAKAGE
1054	GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)	SPONTANEOUS IGNITION IN/OF PART
1055	GO2 PRESSURIZATION (ORB/ET) DISCONNECT (PD4)	SPONTANEOUS IGNITION IN/OF PART
1063	LO2 TANK PRE-PRESS (ORB/GND) DISC (PD9)	FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1064	LO2 TANK PRE-PRESS (ORB/GND) DISC (PD9)	EXTERNAL LEAKAGE
1073	LO2 GROUND FILL & DRAIN (ORB/GND) DISCONNECT (PD12)	EXTERNAL LEAKAGE (INTO AFT FUSELAGE)
1083	LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT (PD13)	EXTERNAL LEAKAGE (INTO AFT FUSELAGE)
1085	LO2 OVERBOARD BLEED (ORB/GND) DISCONNECT (PD13)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1091	GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING (PD15)	EXTERNAL LEAKAGE
1092	GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING (PD15)	EXTERNAL LEAKAGE
1093	GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING (PD15)	SPONTANEOUS IGNITION IN/OF PART
1094	GO2 PRESSURIZATION MANIFOLD TEST POINT COUPLING (PD15)	SPONTANEOUS IGNITION IN/OF PART
1102	LO2 PREVALVE (PV1, 2, 3)	FAILS TO REMAIN OPEN
1103	LO2 PREVALVE (PV1, 2, 3)	EXTERNAL LEAKAGE
1104	LO2 PREVALVE (PV1, 2, 3)	FAILS TO RELIEVE
1107	LO2 PREVALVE (PV1, 2, 3)	FAILS TO REMAIN OPEN
1108	LO2 PREVALVE (PV1, 2, 3)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1123	LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)	EXTERNAL LEAKAGE
1124	LO2 FEEDLINE RELIEF SHUTOFF VALVE (PV7)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1131	LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)	FAILS TO OPEN, FAILS TO REMAIN OPEN

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
1132	LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)	EXTERNAL LEAKAGE
1135	LO2 OUTBOARD FILL AND DRAIN VALVE (PV9)	EXTERIOR LEAKAGE
1151	LO2 INBOARD FILL AND DRAIN VALVE (PV10)	FAILS TO OPEN, FAILS TO REMAIN OPEN
1152	LO2 INBOARD FILL AND DRAIN VALVE (PV10)	EXTERIOR LEAKAGE
1155	LO2 INBOARD FILL AND DRAIN VALVE (PV10)	FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1157	LO2 INBOARD FILL AND DRAIN VALVE (PV10)	EXTERNAL LEAKAGE
1174	LO2 BLEED SHUTOFF VALVE (PV19)	EXTERIOR LEAKAGE
1175	LO2 BLEED SHUTOFF VALVE (PV19)	FAILS TO RELIEVE
1176	LO2 BLEED SHUTOFF VALVE (PV19)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
1183	LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20, 21)	EXTERIOR LEAKAGE
1184	LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20, 21)	FAILS TO RELIEVE
1185	LO2 POGO ACCUMULATOR RECIRCULATION VALVE (PV20, 21)	FAILS TO REMAIN OPEN
1192	LO2 LOW LEVEL LIQUID SENSOR (MT1, 2)	ERRONEOUS OUTPUT (FALSE DRY)
1202	LO2 SYSTEM DELTA P TRANSDUCER (MT44, 50)	EXTERNAL LEAKAGE
1211	LO2 PREPRESS DISCONNECT CHECK VALVE TEST PORT (TP9)	EXTERNAL LEAKAGE
1221	LO2 17 INCH ORBITER DISCONNECT TEST PORT (TP17, 18)	EXTERNAL LEAKAGE
1231	LO2 FEEDLINE RELIEF TEST PORT (TP24)	EXTERNAL LEAKAGE
1241	LO2 FEEDLINE MANIFOLD (MA1)	BLOCKED FLOW
1242	LO2 FEEDLINE MANIFOLD (MA1)	RUPTURE
1243	LO2 FEEDLINE MANIFOLD (MA1)	EXTERNAL LEAKAGE
1252	LO2 FILL & DRAIN LINE (FH1)	RUPTURE
1253	LO2 FILL & DRAIN LINE (FH1)	EXTERNAL LEAKAGE
1261	LO2 17 INCH FEEDLINE (FH2)	BLOCKED FLOW
1262	LO2 17 INCH FEEDLINE (FH2)	RUPTURE
1263	LO2 17 INCH FEEDLINE (FH2)	EXTERNAL LEAKAGE
1271	LO2 12 INCH FEEDLINE (FH3, 4, 5)	BLOCKED FLOW
1272	LO2 12 INCH FEEDLINE (FH3, 4, 5)	RUPTURE
1273	LO2 12 INCH FEEDLINE (FH3, 4, 5)	EXTERNAL LEAKAGE
1281	LO2 FEED MANIFOLD RELIEF VALVE (RV5)	EXTERNAL LEAKAGE
1282	LO2 FEED MANIFOLD RELIEF VALVE (RV5)	FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
1283	LO2 FEED MANIFOLD RELIEF VALVE (RV5)	FAILS TO RELIEVE
2001	LH2 INBOARD FILL AND DRAIN VALVE (PV12)	FAIL TO REMAIN OPEN
2002	LH2 INBOARD FILL AND DRAIN VALVE (PV12)	FAIL TO REMAIN CLOSED
2005	LH2 INBOARD FILL AND DRAIN VALVE (PV12)	FAIL TO RELIEVE
2007	LH2 INBOARD FILL AND DRAIN VALVE (PV12)	EXTERNAL LEAKAGE
2011	LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)	FAIL TO REMAIN OPEN
2012	LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)	FAIL TO REMAIN CLOSED
2013	LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)	FAIL TO OPEN
2016	LH2 OUTBOARD FILL AND DRAIN VALVE (PV11)	EXTERNAL LEAKAGE
2021	LH2 FILL AND DRAIN LINE (FH6)	RUPTURE
2031	LH2 GROUND FILL AND DRAIN (ORB/GND) DISCONNECT (ORBITER HALF) (PD11)	EXTERNAL LEAKAGE
2041	LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORB HALF) (PD17)	EXTERNAL LEAK
2042	LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORB HALF) (PD17)	FAIL TO CLOSE
2043	LH2 HI POINT BLEED (ORB/GND) DISCONNECT (ORB HALF) (PD17)	FAIL TO REMAIN CLOSED
2054	LH2 REPLENISH VALVE (PV13)	FAIL TO REMAIN CLOSED
2055	LH2 REPLENISH VALVE (PV13)	EXTERNAL LEAKAGE
2062	LH2 HI POINT BLEED VALVE (PV22)	FAIL TO REMAIN CLOSED, FAIL TO CLOSE
2063	LH2 HI POINT BLEED VALVE (PV22)	EXTERNAL LEAKAGE
2071	LH2 SYSTEM DELTA-P TRANSDUCER (MT44, MT50)	EXTERNAL LEAKAGE
2081	LH2 HI POINT BLEED LINE (FH19)	RUPTURE
2083	LH2 HI POINT BLEED LINE (FH19)	LOSS OF INSULATING VACUUM
2093	LH2 RECIRCULATION DISCONNECT VALVE (PD3)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED
2094	LH2 RECIRCULATION DISCONNECT VALVE (PD3)	EXTERNAL LEAKAGE
2103	LH2 RECIRCULATION PUMP VALVE (PV14, PV15, PV16)	EXTERNAL LEAKAGE
2111	LH2 PRESTART CONDITIONING MANIFOLD (MA3)	RUPTURE
2112	LH2 PRESTART CONDITIONING MANIFOLD (MA3)	EXTERNAL LEAKAGE
2121	LH2 PRESTART CONDITIONING PUMP LINE (FH11, FH13, FH15)	RUPTURE

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
2131	LH2 PRESTART CONDITIONING RETURN LINE (FH12, FH14, FH16)	RUPTURE
2132	LH2 PRESTART CONDITIONING RETURN LINE (FH12, FH14, FH16)	EXTERNAL LEAKAGE
2141	LH2 PRESTART CONDITIONING REPLENISH LINE (FH17)	RUPTURE
2151	LH2 PRESTART CONDITIONING RETURN LINE (FH18)	RUPTURE
2161	LH2 RECIRCULATION MANIFOLD RELIEF VALVE (RV7)	FAIL TO OPEN (RELIEVE)
2163	LH2 RECIRCULATION MANIFOLD RELIEF VALVE (RV7)	EXTERNAL LEAKAGE
2177	LH2 RECIRCULATION PUMP (PP1, PP2, PP3)	EXTERNAL LEAKAGE
2182	LH2 PRE-PRESS CHECK VALVE (CV17)	FAIL TO CLOSE (RESEAT), FAIL TO REMAIN CLOSED
2183	LH2 PRE-PRESS CHECK VALVE (CV17)	EXTERNAL LEAKAGE
2191	GH2 PRESSURIZATION ISOLATION CHECK VALVE (CV21,CV22,CV23)	FAIL TO OPEN, FAIL TO REMAIN OPEN
2192	GH2 PRESSURIZATION ISOLATION CHECK VALVE (CV21,CV22,CV23 AND TEST PORTS TP5,TP6,TP7)	EXTERNAL LEAKAGE
2201	GH2 PRESSURIZATION FLOW CONTROL VALVE (LV56,LV57,LV58)	FAIL TO OPEN, FAIL TO REMAIN OPEN
2202	GH2 PRESSURIZATION FLOW CONTROL VALVE (LV56,LV57,LV58)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED
2203	GH2 PRESSURIZATION FLOW CONTROL VALVE (LV56,LV57,LV58)	EXTERNAL LEAKAGE
2211	GH2 PRESSURIZATION DISCONNECT (PD5)	FAIL TO OPEN, FAIL TO REMAIN OPEN
2212	GH2 PRESSURIZATION DISCONNECT (PD5)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED
2213	GH2 PRESSURIZATION DISCONNECT (PD5)	EXTERNAL LEAKAGE
2222	LH2 TANK GROUND PRE-PRESS DISCONNECT (PD10)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED, EXTERNAL LEAKAGE
2231	GH2 PRESSURIZATION MANIFOLD TEST POINT COUPLING (PD16)	EXTERNAL LEAKAGE
2241	LH2 PREPRESSURIZATION DISCONNECT CHECK VALVE TEST PORT (TP10)	EXTERNAL LEAKAGE
2251	GH2 PRESSURIZATION DUAL CHECK VALVE TEST PORT (TP21,TP22,TP23)	EXTERNAL LEAKAGE
2261	LH2 FEED DISCONNECT VALVE (PD2)	FAIL TO OPEN, FAIL TO REMAIN OPEN
2262	LH2 FEED DISCONNECT VALVE (PD2)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED
2263	LH2 FEED DISCONNECT VALVE (PD2)	EXTERNAL LEAKAGE

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
2271	LH2 PREVALVE (PV4,PV5,PV6)	FAIL TO OPEN, FAIL TO REMAIN OPEN
2273	LH2 PREVALVE (PV4,PV5,PV6)	EXTERNAL LEAKAGE
2274	LH2 PREVALVE (PV4,PV5,PV6)	FAIL TO RELIEVE
2281	LH2 17 INCH ORBITER DISCONNECT TEST PORT (TP11,TP12)	EXTERNAL LEAKAGE
2291	LH2 FEEDLINE MANIFOLD (MA2)	RUPTURE
2292	LH2 FEEDLINE MANIFOLD (MA2)	RESTRICTED FLOW
2301	LH2 17 INCH FEEDLINE (FH7)	RUPTURE
2302	LH2 17 INCH FEEDLINE (FH7)	RESTRICTED FLOW
2311	LH2 12 INCH FEEDLINE (FH8,FH9,FH10)	RUPTURE
2312	LH2 12 INCH FEEDLINE (FH8,FH9,FH10)	RESTRICTED FLOW
2321	LH2 FEEDLINE RELIEF SHUTOFF VALVE (PV8)	FAIL TO OPEN, FAIL TO REMAIN OPEN
2322	LH2 FEEDLINE RELIEF SHUTOFF VALVE (PV8)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED
2323	LH2 FEEDLINE RELIEF SHUTOFF VALVE (PV8)	EXTERNAL LEAKAGE
2331	LH2 FEEDLINE RELIEF LINE TEST PORT (TP25)	EXTERNAL LEAKAGE
2341	LH2 FEEDLINE MANIFOLD RELIEF VALVE (RV6)	FAIL TO OPEN (RELIEVE)
2352	LH2 DUMP PRESSURIZATION ORIFICE (RP10)	EXTERNAL LEAK
2373	LH2 PRESSURIZATION LINE VENT VALVE (LV52)	EXTERNAL LEAKAGE
2381	LH2 FEED RTLS INBOARD VALVE (PV17)	FAIL TO OEPN, FAIL TO REMAIN OPEN
2382	LH2 FEED RTLS INBOARD VALVE (PV17)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED
2383	LH2 FEED RTLS INBOARD VALVE (PV17)	EXTERNAL LEAKAGE
2391	LH2 FEED RTLS OUTBOARD VALVE (PV18)	FAIL TO OPEN, FAIL TO REMAIN OPEN
2392	LH2 FEED RTLS OUTBOARD VALVE (PV18)	FAIL TO CLOSE, FAIL TO REMAIN CLOSED
2393	LH2 FEED RTLS OUTBOARD VALVE (PV18)	EXTERNAL LEAKAGE
3010	ENGINE HELIUM SUPPLY CHECK VALVE (CV1,CV2,CV3)	FAILS TO CLOSE, OR REMAIN CLOSED
3020	HELIUM SUPPLY DISCONNECT (ORB/GND, ORB HALF), (PD8)	FAILS TO CLOSE, OR REMAIN CLOSED
3021	HELIUM SUPPLY DISCONNECT (ORB/GND, ORB HALF), (PD8)	EXTERNAL LEAKAGE
3030	TEST PORT (TP8)	LEAKAGE
3040	17.3 CU. FT. HELIUM SUPPLY TANK (TK6, 8, 10)	RAPID LEAK
3050	4.7 CU. FT. HELIUM SUPPLY TANK (TK1,2,3,7,9,11)	RAPID LEAK

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
3060	PRESSURE TAP PORT (TP26,27,28)	RAPID LEAK
3071	ENGINE HELIUM SUPPLY CHECK VALVE (CV25,26;36,37;41,42)	FAILS TO OPEN, OR REMAIN OPEN
3080	ENGINE HELIUM SUPPLY FILTER - PANEL A;B (FL2,6;3,7;4,8)	RESTRICTED FLOW, BLOCKAGE
3081	ENGINE HELIUM SUPPLY FILTER - PANEL A;B (FL2,6;3,7;4,8)	EXTERNAL LEAKAGE
3082	ENGINE HELIUM SUPPLY FILTER - PANEL A;B (FL2,6;3,7;4,8)	STRUCTURAL FAILURE (ELEMENT COLLAPSE)
3092	ENGINE HELIUM SUPPLY ISOLATION VALVE (LV1,2;3,4;5,6)	EXTERNAL LEAKAGE
3111	ENGINE HELIUM PRESSURE REGULATOR (PR1,7;2,8;3,9)	FAILS OUT OF TOLERANCE (HIGH)
3112	ENGINE HELIUM PRESSURE REGULATOR (PR1,7;2,8;3,9)	EXTERNAL LEAKAGE
3120	HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)	FAILS TO CLOSE (RESEAT), OR REMAIN CLOSED
3121	ENGINE HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)	INTERNAL LEAKAGE
3122	ENGINE HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)	FAILS TO OPEN
3123	ENGINE HE RELIEF VALVE PANEL A;B (RV1,8;2,9;3,10)	EXTERNAL LEAKAGE
3130	ENGINE HELIUM SUPPLY RELIEF VALVE SENSE LINE	EXTERNAL LEAKAGE
3150	ENGINE HELIUM SUPPLY INTERCONNECT INLET VALVE (LV59,61,63)	FAILS TO OPEN OR REMAIN OPEN
3162	ENGINE HELIUM SUPPLY INTERCONNECT OUTLET VALVE (LV60,62,64)	EXTERNAL LEAKAGE
3181	ENGINE HELIUM INTERCONNECT CHECK VALVE-PANEL INLET (CV27,38,43)	FAILS TO OPEN, OR REMAIN OPEN
3200	FACILITY PORTS	GROSS LEAKAGE
4021	PNEU VALVE HE ISOLATION CHECK VALVE (CV8)	FAILS TO OPEN, EXTERNAL LEAKAGE
4030	PNEU VALVE HE ISOLATION CHECK VALVE (CV9)	FAILS TO OPEN, EXTERNAL LEAKAGE
4051	LO2 FEED MANIF REPRESS CHECK VALVE (CV12)	FAILS TO OPEN
4090	LO2 TANK PRE-PRESS CHECK VALVE (CV16)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4100	LH2 TANK PRE-PRESS CHECK VALVE (CV17)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4152	LO2 PREVALVE OPENING SOLENOID (LV12,LV14,LV16)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
4160	LO2 PREVALVE OPENING SOLENOID (LV13,LV15,LV17)	FAILS TO OPEN, EXTERNAL LEAKAGE
4161	LO2 PREVALVE CLOSING SOLENOID (LV13,LV15,LV17)	FAILS TO REMAIN OPEN
4166	LH2 PREVALVE OPENING SOLENOID (LV18,LV20,LV22)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4167	LH2 PREVALVE CLOSING SOLENOID (LV19,LV21,LV23)	FAILS TO OPEN, EXTERNAL LEAKAGE
4168	LH2 PREVALVE CLOSING SOLENOID (LV19,LV21,LV23)	FAILS TO REMAIN OPEN
4170	LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)	FAILS TO OPEN, EXTERNAL LEAKAGE
4171	LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)	FAILS TO REMAIN OPEN
4172	LO2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV24)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4180	LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV25)	FAILS TO OPEN, EXTERNAL LEAKAGE
4181	LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV25)	FAILS TO REMAIN OPEN
4182	LH2 FEEDLINE RELIEF SHUTOFF VALVE CLOSING SOLENOID (LV25)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4190	HE SUPPLY BLOWDOWN VALVE (LV26,LV27)	FAILS TO OPEN, EXTERNAL LEAKAGE
4192	HE SUPPLY BLOWDOWN VALVE (LV26,LV27)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4202	LO2 OUTBOARD FILL VALVE OPENING SOLENOID (LV28)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4222	LO2 INBOARD FILL VALVE OPENING SOLENOID (LV30)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4224	LO2 INBOARD FILL VALVE CLOSING SOLENOID (LV31)	FAILS TO REMAIN OPEN
4228	LH2 OUTBOARD FILL VALVE OPENING SOLENOID (LV32)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4234	LH2 INBOARD FILL VALVE OPENING SOLENOID (LV34)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4236	LH2 INBOARD FILL VALVE CLOSING SOLENOID (LV35)	FAILS TO REMAIN OPEN, EXTERNAL LEAKAGE
4252	LH2 REPLENISH VALVE OPENING SOLENOID (LV39)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4260	LO2 MANIFOLD REPRESS VALVE (LV40,LV41)	FAILS TO OPEN, EXTERNAL LEAKAGE

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
4261	LO2 MANIFOLD REPRESS VALVE (LV40,LV41)	FAILS TO REMAIN OPEN
4281	LO2 FEED DISCONNECT VALVE OPENING SOLENOID (LV46)	FAILS TO REMAIN OPEN, EXTERNAL LEAKAGE
4301	LH2 FEED DISCONNECT VALVE OPENING SOLENOID (LV48)	FAILS TO REMAIN OPEN, EXTERNAL LEAKAGE
4322	LH2 RECIRC DISCONNECT VALVE OPENING SOLENOID (LV50)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4330	LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID (LV51)	FAILS TO OPEN, EXTERNAL LEAKAGE
4331	LH2 RECIRC DISCONNECT VALVE CLOSING SOLENOID (LV51)	FAILS TO REMAIN OPEN
4340	LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID (LV72)	FAILS TO OPEN, EXTERNAL LEAKAGE
4341	LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID (LV72)	FAILS TO REMAIN OPEN
4342	LH2 FEED RTLS INBOARD DUMP VALVE OPENING SOLENOID (LV72)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4350	LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID (LV73)	FAILS TO OPEN, EXTERNAL LEAKAGE
4351	LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID (LV73)	FAILS TO REMAIN OPEN
4352	LH2 FEED RTLS OUTBOARD DUMP VALVE OPENING SOLENOID (LV73)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4362	LH2 FEED MANIFOLD RTLS PRESS VALVE (LV74,LV75)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4370	LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76)	FAILS TO OPEN, EXTERNAL LEAKAGE
4371	LO2 OVERBOARD BLEED VALVE CLOSING SOLENOID (LV76)	FAILS TO REMAIN OPEN
4382	LO2 POGO ACCUM RECIRC VALVE CLOSING SOLENOID (LV77,LV78)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4392	LH2 HI POINT BLEED VALVE OPENING SOLENOID (LV79)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4400	LO2 PREVALVE REDUNDANT CLOSING SOLENOID (LV80,LV81, LV82)	FAILS TO OPEN, EXTERNAL LEAKAGE
4401	LO2 PREVALVE REDUNDANT CLOSING SOLENOID (LV80,LV81, LV82)	FAILS TO REMAIN OPEN
4412	LO2 PREVALVE REDUNDANT OPENING SOLENOID (LV83,LV84, LV85)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
4420	LO2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF) (PD9)	FAILS TOA CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4422	LO2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF) (PD9)	EXTERNAL LEAKAGE
4430	LH2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF) (PD10)	FAILS TO CLOSE, FAILS TO REMAIN CLOSED, INTERNAL LEAKAGE
4432	LH2 TANK GND PRE-PRESS (ORB/GND) DISC. (ORB HALF) (PD10)	EXTERNAL LEAKAGE
4460	TEST PORT, PNEU HE OUTLET (TP1)	EXTERNAL LEAKAGE
4490	TEST PORT, LO2 PREPRESS DISC. CHECK VALVE (TP9)	EXTERNAL LEAKAGE
4500	TEST PORT, LH2 PREPRESS DISC. CHECK VALVE (TP10)	EXTERNAL LEAKAGE
4510	TEST PORT, PNEU SUPPLY HELIUM (TP29)	EXTERNAL LEAKAGE
4530	PNEU VALVE HE SUPPLY REGULATOR (PR4)	RESTRICTED FLOW, FAILS TO OPEN, EXTERNAL LEAKAGE
4540	LO2 MANIF REPRESS REGULATOR (PR5)	RESTRICTED FLOW, FAILS TO OPEN, EXTERNAL LEAKAGE
4550	LH2 MANIF REPRESS REGULATOR (PR6)	RESTRICTED FLOW, FAILS TO OPEN, EXTERNAL LEAKAGE
4570	PNEU VALVE HE SUPPLY TANK (TK4)	EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)
4580	LO2 PREVALVE PNEU ACCUMULATOR (AU5)	EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)
4590	LH2 PREVALVE PNEU ACCUMULATOR (AU6)	EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)
4630	PNEUMATIC HE PRESSURE LINE (.50" DIA)	STRUCTURAL FAILURE (RUPTURE)
4640	PNEUMATIC HE PRESS VALVE ACTUATION LINE (.25",.38" DIA)	STRUCTURAL FAILURE (RUPTURE)
4650	PNEUMATIC HELIUM INTERCONNECT LINE (.63",1.00",.50" DIA)	STRUCTURAL FAILURE (RUPTURE)
5001	LO2 PREVALVE TOGGLE SWITCH	FAILS (SHORTS) (FALSE OPEN COMMAND)
5002	LO2 PREVALVE TOGGLE SWITCH	FAILS (SHORTS) (FALSE CLOSE COMMAND)
5003	FUSE (1A) (4 PER CIRCUIT)	FAILS OPEN (INHIBIT CLOSE COMMAND)
5004	FUSE (1A) (4 PER CIRCUIT)	FAILS OPEN (INHIBIT OPEN COMMAND)
5011	MDM (FA1)	PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING SOLENOIDS)
5012	MDM (FA2)	PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING SOLENOIDS)

<u>MDAC</u> <u>ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
5013	MDM (FA3)	PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING SOLENOIDS)
5014	MDM (FA4)	PREMATURE/ERRONEOUS OFF (INHIBITS CLOSING SOLENOIDS)
5031	HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)	FAIL ON (FALSE OPEN COMMAND, ACTIVATE LV12, LV14, LV16)
5033	HYBRID DRIVER, TYPE 1	FAIL OFF (INHIBIT LV12, LV14, LV16)
5035	DIODE, ISOLATION (12A) (2 PER CIRCUIT)	FAILS OPEN, FAILS TO CONDUCT POWER
5041	HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)	FUSE FAIL OPEN (INHIBIT LV13, LV15, LV17)
5042	HYBRID DRIVER, TYPE 1	FAIL OFF (INHIBIT LV13, LV15, LV17)
5043	REMOTE POWER CONTROLLER (2 PER CIRCUIT)	PREMATURE/ERRONEOUS OFF (INHIBIT LV13, LV15, LV17)
5044	DIODE, ISOLATION (12A) (2 PER CIRCUIT)	FAILS OPEN, FAILS TO CONDUCT POWER (INHIBIT LV13, LV15, LV17)
5051	HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)	FUSE FAIL OPEN (INHIBIT LV80, LV81, LV82)
5052	REMOTE POWER CONTROLLER (2 PER CIRCUIT)	PREMATURE/ERRONEOUS OFF (INHIBIT LV80, LV81, LV82)
5053	DIODE, ISOLATION (12A) (2 PER CIRCUIT)	FAILS OPEN, FAILS TO CONDUCT POWER (INHIBIT LV80, LV81, LV82)
5061	HYBRID DRIVER, TYPE 3 (2 PER CIRCUIT)	FAIL ON (FALSE OPEN COMMAND, ACTIVATE LV83, LV84, LV85)
5064	DIODE, ISOLATION (12A) (2 PER CIRCUIT)	FAILS OPEN, FAILS TO CONDUCT POWER
5071	DIODE (10 PER CIRCUIT)	FAILS OPEN (INHIBIT OPEN COMMAND TO OPENING SOLENOIDS)
5072	DIODE (2 PER CIRCUIT)	FAILS OPEN (INHIBIT OPEN COMMAND TO OPENING SOLENOIDS)
5073	DIODE (3 PER CIRCUIT)	FAILS OPEN (INHIBIT OPEN COMMAND TO OPENING SOLENOIDS)
5074	DIODE (10 PER CIRCUIT)	FAILS OPEN (INHIBIT CLOSE COMMAND TO CLOSING SOLENOIDS)
5075	DIODE (6 PER CIRCUIT)	FAILS OPEN (INHIBIT CLOSE COMMAND TO CLOSING SOLENOIDS)
5076	DIODE (7 PER CIRCUIT)	FAILS OPEN (INHIBIT CLOSE COMMAND TO CLOSING SOLENOIDS)
5121	LO2 FEEDLINE RELIEF SHUTOFF VALVE TOGGLE SWITCH	FAIL SHORTED OPEN-TO-BUS (ACTIVATE LV24)
5122	LO2 FEEDLINE RELIEF SHUTOFF VALVE TOGGLE SWITCH	FAIL PREMATURE OPEN-TO-BUS (ACTIVATE LV24)
5125	HYBRID DRIVER, TYPE 3 (AR42)	FUSE FAIL ON (ACTIVATE LV24)
5127	HYBRID DRIVER, TYPE 3 (AR30)	FUSE FAIL ON (ACTIVATE LV24)
5128	REMOTE POWER CONTROLLER (RPC28)	FAIL ON/CLOSED (ACTIVATE LV24)

<u>MDAC ID</u>	<u>ITEM</u>	<u>FAILURE MODE</u>
5129	REMOTE POWER CONTROLLER (RPC32)	FAIL ON/CLOSED (ACTIVATE LV24)
5130	REMOTE POWER CONTROLLER (RPC32)	FAIL OPEN (INHIBIT LV24)
5132	MDM (FA3)	PREMATURE/ERRONEOUS ON (ACTIVATE LV24)
5134	MDM (FA1)	PREMATURE/ERRONEOUS ON (ACTIVATE LV24)
5136	MDM (FA2)	PREMATURE/ERRONEOUS ON (ACTIVATE LV24)
5141	LO2 PROPELLANT DUMP SEQUENCE TOGGLE SWITCH	SHORTS (PREMATURE DUMP START)
5142	LO2 PROPELLANT DUMP SEQUENCE TOGGLE SWITCH	FAIL OPEN (DUMP IS NOT STARTED)
5143	FUSE (F31, F32)	FAIL OPEN (DUMP IS NOT STARTED)
5165	FUSE	FAIL OPEN (PREMATURE DEACTIVATE LV28)
5168	HYBRID DRIVER, TYPE 3	FAIL OFF (PREMATURE DEACTIVATION LV28)
5169	HYBRID DRIVER, TYPE 3	FAIL ON (PREMATURE ACTIVATION OF LV29)
5506	FUSE (2) (1A)	FAIL PREMATURE OFF (INHIBIT LV30)
5507	FUSE (1A)	FAIL OPEN/PREMATURE OFF (INHIBIT LV31)
5511	HYBRID DRIVER, TYPE 3	FAIL ON THE OPEN COMMAND
5512	HYBRID DRIVER, TYPE 3	FAIL PREMATURE/ERRONEOUS ON THE OPEN COMMAND
5513	HYBRID DRIVER, TYPE 3	FAIL PREMATURE OFF (INHIBIT LV30)
5514	HYBRID DRIVER, TYPE 3	FAIL OPEN/PREMATURE OFF (INHIBIT LV31)
5515	HYBRID DRIVER, TYPE 3	FAIL ON (PREMATURE/ERRONEOUS ACTIVATE LV31)
5551	HYBRID DRIVER, TYPE 3	FUSE FAIL OPEN (INHIBIT LV76)
5552	HYBRID DRIVER, TYPE 3	FUSE FAIL OPEN (INHIBIT LV76)
5553	HYBRID DRIVER, TYPE 1	FUSE FAIL OPEN (INHIBIT LV76)
5554	REMOTE POWER CONTROLLER (RPC24)	FAIL OPEN (INHIBIT LV76)
5555	REMOTE POWER CONTROLLER (RPC23)	FAIL OPEN (INHIBIT LV76)
5556	MDM (FA2)	PREMATURE/ERRONEOUS OFF (INHIBIT LV76)
5557	MDM (FA3)	PREMATURE/ERRONEOUS OFF (INHIBIT LV76)
5558	MDM (FA4)	PREMATURE/ERRONEOUS OFF (INHIBIT LV76)
5559	DIODE (12A)	FAIL OPEN/SHORT (INHIBIT LV76)

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5560	DIODE (12A)	FAIL OPEN/SHORT (INHIBIT LV76)
5561	DIODE	FAIL OPEN/SHORT (INHIBIT LV76)
5766	REMOTE POWER CONTROLLER (RPC 19)	FAILS PREMATURE/OFF (INHIBIT LV46)
5767	REMOTE POWER CONTROLLER (RPC 20)	FAILS PREMATURE/OFF (INHIBIT LV46)
5771	HYBRID DRIVER, TYPE 3	FAIL ON (FALSE CLOSE COMMAND)
5772	HYBRID DRIVER, TYPE 1	PREMATURE/ERRONEOUS ON (FALSE CLOSE COMMAND)
5773	HYBRID DRIVER, TYPE 3	FAIL ON (FALSE CLOSE COMMAND)
5774	REMOTE POWER CONTROLLER (RPC 20)	FAIL ON/CLOSED
5775	REMOTE POWER CONTROLLER (RPC 21)	FAIL ON/CLOSED
5778	DIODE (12A)	FAIL OPEN (INHIBIT LV47)
5779	DIODE (12A)	FAIL OPEN (INHIBIT LV47)
6012	HYBRID DRIVER CONTROLLER (6)	FAIL OPEN
6013	REMOTE POWER CONTROLLER (4)	FAIL OPEN, FAIL CLOSED, INADVERTENT OPERATION
6014	ISOLATION AND BLOCKING DIODES (6)	FAIL OPEN
6015	FLIGHT CRITICAL AFT MDM (3)	FAIL ON, FAIL OFF
6016	INDICATOR SWITCH (PD2)	FAIL OPEN, FAIL TO TRANSFER
6026	FLIGHT CRITICAL AFT MDM (FA1,FA3,FA4)	FAIL ON, INADVERTENT OPERATION
6071	FUSE, 1A (3)	FAIL OPEN
6072	TOGGLE SWITCH	FAIL OPEN
6073	TOGGLE SWITCH	FAIL SHORTED
6075	HYBRID DRIVER CONTROLLER	INADVERTENT OUTPUT (SHORTED)
6078	MDM (FA1, 2, LA1)	FAIL ON, INADVERTENT OPERATION
6081	1A FUSE	FAIL OPEN
6082	TOGGLE SWITCH, 32V73A438	FAIL OPEN
6085	HYBRID DRIVER CONTROLLER	INADVERTENT OUTPUT, SHORTED
6086	ISOLATION DIODE (4)	FAIL OPEN
6088	MDM	FAIL OPEN, INADVERTENT OUTPUT
6102	REMOTE POWER CONTROLLER (2)	FAIL OPEN, INADVERTENT OPERATION
6103	HYBRID DRIVER CONTROLLER	FAIL OPEN
6105	TOGGLE SWITCH	FAIL SHORTED, INADVERTENT OPERATION
6108	ISOLATION DIODE (3)	FAIL OPEN
6109	MDM (FA1, FA3, FA4)	FAIL OPEN
6121	HYBRID DRIVER CONTROLLER	FAIL ON, SHORTED, INADVERTENT OUTPUT
6122	HYBRID DRIVER CONTROLLER	FAIL OPEN

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6123	FUSE (3)	FAIL OPEN
6141	MDM (FA4)	FAILS OPEN, INADVERTENT OPERATION, FAILS ON
6142	HYBRID DRIVER CONTROLLER (2)	FAIL OPEN
6155	HYBRID DRIVER CONTROLLER, TYPE I (6)	FAIL OPEN, FAIL SHORTED
6156	HYBRID DRIVER CONTROLLER, TYPE III (12)	FAIL OPEN, FAIL SHORTED
6157	ISOLATION DIODES, 12A (18)	FAIL OPEN
6158	ISOLATION DIODES, 4.2A (3)	FAIL OPEN
6159	ISOLATION DIODE (36)	FAIL OPEN
6160	MODULATOR DEMODULATOR (4)	FAIL OPEN, FAIL SHORTED, ERRONEOUS OUTPUT
7110	FUSE, 1AMP (9)	OPEN, FAILS TO CONDUCT
7120	TOGGLE SWITCH, 1P3T (3)	OPEN, FAILS TO TRANSFER, SHORTED
7130	TOGGLE SWITCH, 2P3T (3)	OPEN, FAILS TO TRANSFER, SHORTED
7160	ISOLATION DIODES (6)	SHORTED, OPEN
7170	ISOLATION DIODES (9)	FAILS OPEN
7180	ISOLATION DIODES (3)	FAILS OPEN
7190	MDM, FLIGHT AFT 1,2,3,4	FAILS OPEN, ERRONEOUS OUTPUT (OFF)
7210	FUSE, 1AMP (6)	OPEN, FAILS TO CONDUCT
7220	TOGGLE SWITCH, 2P3T (3)	OPEN, FAILS TO TRANSFER, SHORTED
7231	ISOLATION DIODES (6)	SHORTED
7260	ISOLATION DIODES (12)	FAILS OPEN

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